WORK PLAN AND SAMPLING AND ANALYSIS PLAN

KAPALAMA MILITARY RESERVATION BUILDING 905

NRC Incident Report # 1110148

Prepared for:
State of Hawaii
Department of Transportation
Harbors Division
727 Kakoi Street
Honolulu, HI 96819

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March 30, 2015

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APPENDICIES

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ACRONYMS AND ABBREVIATIONS

ACG	analytical concentration goal
ACSI	Advanced Compliance Solutions, Inc.
ASTM	American Society for Testing and Materials
CFR	Code of Federal Regulations
COC	chain-of-custody
DQO	data quality objective
DLNR	Department of Land and Natural Resources
DOT	Department of Transportation
DU	decision unit
EPA	U.S. Environmental Protection Agency
FEIS	Final Environmental Impact Statement
GC/MS	gas chromatography/mass spectrometry
HDOH	Hawaii Department of Health
HEER	Hazard Evaluation and Emergency Response
KMR	Kapalama Military Reservation
MS/MSD	matrix spike/matrix spike duplicate
PARCC	precision, accuracy, representativeness, completeness, and comparability
PCB	polychlorinated biphenyl
PCS	Pacific Commercial Services
PPE	personal protective equipment
PRC	performance reference compound
QA/QC	quality assurance and quality control
QAPP	quality assurance project plan
RAL	remedial action level
SAP	sampling and analysis plan
SOP	standard operating procedure
SOW	statement of work
TGM	Technical Guidance Manual

TMDL	Total Maximum Daily Load
TOC	total organic carbon
UH	University of Hawaii

CERTIFICATION
STATE OF HAWAII, DEPARTMENT OF TRANSPORTATION, HARBORS

The undersigned hereby certifies that all sampling plans, sample collection procedures, sample preparation procedures, extraction procedures, and instrumental/chemical analysis procedures used to assess or characterize Polychlorinated Biphenyls (PCBs) that are referenced in this report are on file at the State of Hawaii, Department of Transportation, Harbors Engineering Special Projects Section office located at 79 South Nimitz Hwy, Honolulu, Hawaii 96813, and are available for EPA inspection.

Under civil and criminal penalties of law for the making or submission of false or fraudulent statements or representations (18 U.S.C. 1001 and 15 U.S.C. 2615), I certify that the information contained in or accompanying this document is true, accurate, and complete. As to the identified section(s) of this document for which I cannot personally verify truth and accuracy, I certify as the company official have supervisory responsibility for the persons who, acting under my direct instructions, made the verification that this information is true, accurate, and complete.

4/8/15

Darrell T. Young, Deputy Director Date
DOT- Harbors Division

CERTIFICATION OF PARTY PERFORMING CLEANUP
PACIFIC COMMERCIAL SERVICES AND
ADVANCED COMPLIANCE SOLUTIONS, INC.

The undersigned hereby certifies that all sampling plans, sample collection procedures, sample preparation procedures, extraction procedures, and instrumental/chemical analysis procedures used to assess or characterize Polychlorinated Biphenyls (PCBs) that are referenced in this report are on file at Pacific Commercial Services' office located at 91-254 Olai Street, Kapolei, HI 96707 and are available for EPA inspection.

Under civil and criminal penalties of law for the making or submission of false or fraudulent statements or representations (18 U.S.C. 1001 and 15 U.S.C. 2615), I certify that the information contained in or accompanying this document is true, accurate, and complete. As to the identified section(s) of this document for which I cannot personally verify truth and accuracy, I certify as the company official have supervisory responsibility for the persons who, acting under my direct instructions, made the verification that this information is true, accurate, and complete.

Jingbo Chang 04/01/2015

Jingbo Chang, General Manager Date
Pacific Commercial Services LLC
Cleanup Contractor

Dennis Poma 3/30/15

Dennis Poma, President Date
Advanced Compliance Solutions, Inc.
Work Plan and Sampling & Analysis Plan Preparer

1 INTRODUCTION AND PURPOSE

This Work Plan (WP) and Sampling and Analysis Plan (SAP) has been prepared to describe the removal action work and verification sampling procedures to clean up the PCB transformer spill at the Kapalama Military Reservation (KMR), Building 905. The cleanup will be performed by Pacific Commercial Services under and emergency response contract with the State of Hawaii, Department of Transportation (HDOT). The site owner is the HDOT, Harbors Division, with offices at 79 S. Nimitz Hwy, Honolulu, HI 96813. The physical address of the site is 1845 Auiki Street, Building 905, Honolulu, Hawaii 96819, with a Tax Map Key (TMK) of (1) 1-2-25:054. The release was reported to the National Response Center (NRC) on March 10, 2015 and the corresponding incident report number is NRC 1110148.

This document describes the purpose and outlines the objectives, procedures and analytical protocols for conducting the removal action work and verification sampling at a transformer site adjacent to Building 905. Around November 24, 2014, a transformer was apparently vandalized and Polychlorinated biphenyls (PCB) containing mineral oil was released. Testing of the mineral oil remaining in the transformer resulted in a concentration of 582 mg/L, which by definition under 40 CFR 761.3 is considered a “Mineral Oil PCB Transformer” (i.e., any transformer originally designed to contain mineral oil as the dielectric fluid and which has been tested and found to contain 500 ppm or greater PCBs). Additionally, under the Subpart G, Spill Cleanup Policy, this spill would be considered a “High-Concentration” PCB spill (i.e., greater than 500 ppm) and the requirements of 40 CFR 761.125(a) and (c) shall be followed by HDOT, namely reporting the spill to the National Response Center, recording and documenting the area of visible contamination, and initiating cleanup of all visible traces of fluid on soil or other media (e.g., pavement). As such, the cleanup, any characterization, verification, and disposal of PCB-contaminated soil and media are further regulated under 40 CFR 761.61, PCB Remediation Waste, specifically, in this case under the risk-based cleanup requirements of 40 CFR 761.61(c).

Any person wishing to sample, cleanup, or dispose of PCB remediation waste in a manner other than prescribed by part 761(a), Self-Implementing, must apply to the Regional Administrator. The State of Hawaii Department of Health (HDOH) Hazard Evaluation and Emergency Response (HEER) Branch has been working with the EPA on alternatives to default sampling procedures and has previously submitted request to the EPA to grant such alternatives under the Risk-based option. HDOH recommends and suggest that the alternative “incremental sampling” described in the most current edition of the HDOH HEER Technical Guidance Manual (TGM) and other pertinent HDOH guidance (HDOH 2009, 2011a) should be used for cleanup, verification and disposal. Therefore, in accordance with recent communication between HDOT and the Environmental Protection Agency (EPA), this WP and SAP presents alternatives to meet the Risk-based approach. Specifically, the EPA has agreed to an alternative verification sampling technique (multi-incremental sampling) in lieu of statistically based discrete sampling, and HDOT must submit a risk-based disposal application for approval by the EPA. The contents of this WP and SAP are intended to meet the application requirements (40 CFR 761.61(a)(3)).

1.1 PROJECT OBJECTIVES

The primary objective of this work is to remove the existing transformer unit, remove and dispose of the concrete pad supporting the transformer, excavate and remove PCB contaminated media (pavement, concrete, and soil), and verify that the removal was effective. The debris and contaminated media will be packaged and transported to either an incinerator that complies with 40 CFR 761.70 or a chemical waste landfill approved under 40 CFR 761.75, depending on the type of article or waste media. Post removal verification sampling will be conducted to confirm the contaminant source has been removed.

Generally the following objectives apply:

- Prepare a work plan and sampling analysis plan to record and document the area of visible contamination, describe the removal actions and verification procedures.
- Mobilize to site and conduct removal and disposal of the transformer, the 12 foot by 12 foot concrete pad under the transformer, and the pavement and soil extending two foot past the chain link fenced area protecting the transformer to a depth of 2 feet; an area 22 ft x 24 ft (528 square feet, or approximately 40 cy).
- Remove and dispose of the concrete wall and footing section that is below grade and presumed contaminated.
- Conduct verification sampling of the removal area and step out decision units to determine that the area has met cleanup goals.
- Install and maintain temporary environmental and engineering controls, including storm water protection measures (perimeter silt socks or barriers, drain protection, plastic covering, protected storage, for example).
- Conduct additional removal, if required and as appropriate, based on verification results. It is intended to dispose of additional media at a non-TSCA local disposal facility if PCB concentrations are above the action level but below 50 ppm.
- Restore area with temporary clean backfill so construction may continue in area. Area will eventually be a container yard and have either a hardened surface (concrete or pavement) over it.
- Demobilize from site.
- Prepare final documentation recording removal and disposal results.

2 BACKGROUND

2.1 SITE DESCRIPTION

KMR is comprised of a number of parcels owned by the State Department of Land and Natural Resources (DLNR) and managed by the State of Hawaii Department of Transportation (DOT) Harbors Division. The KMR site is bound by Kapālama Basin and Kalihi Channel on the south, Servco Pacific Inc. and Sand Island Access Road on the west, Auiki Street and Young Brothers Limited on the north, and Pier 41 on the east (see Figure 1 below). The 94-acre site has been occupied by the University of Hawaiʻi (UH) Marine Center, Pacific Shipyard International, Island Movers, Atlantis Submarines, and numerous other smaller tenants. Structures were built in the late 1930s into the 1940s and are currently being demolished.

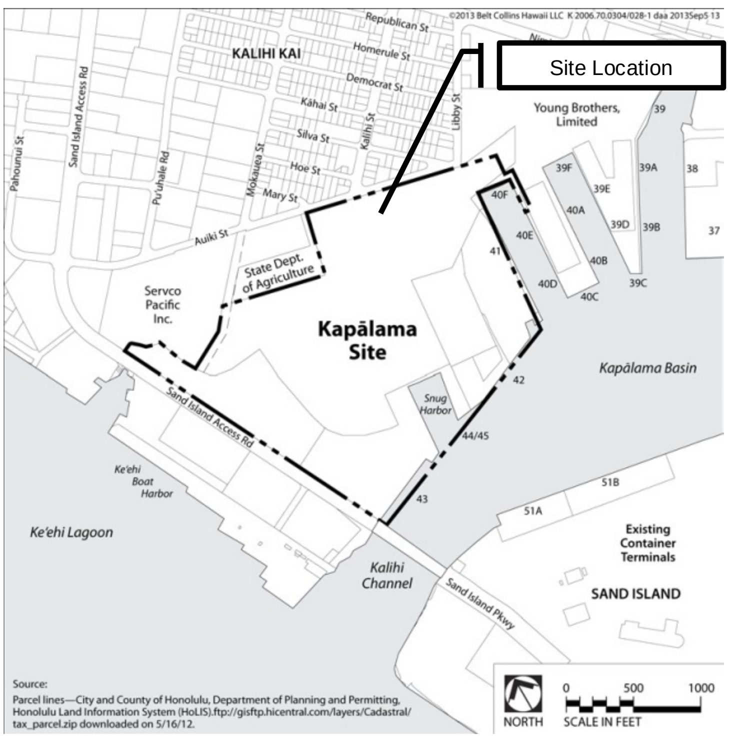

Figure 1 - Site Location

The site has accommodated a range of uses. Since the 1940s, the site has been in waterfront commercial and industrial use including the U.S. Army's Support Command Logistics and Maintenance Installation (established in 1941) as a major military port and quartermaster warehousing facility to handle shipping requirements for the Army during World War II; a dredging and construction company (1957 to 1968); shipyard companies (1968 to present); and y the university marine research center. Easements for energy transmission lines are also present.

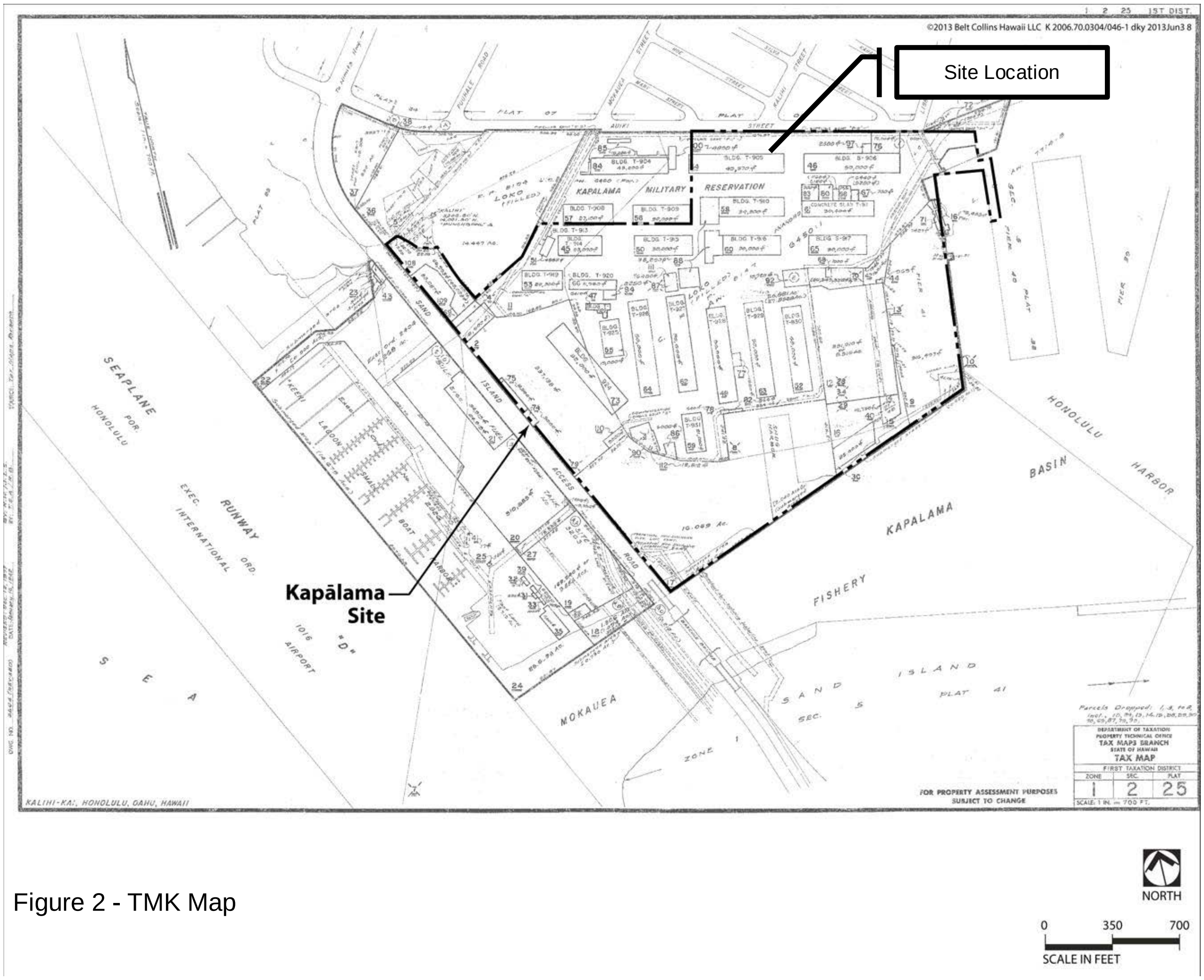

Figure 2 - TMK Map

The topography of the site is fairly level, sloping about 0.5 percent from the center both south toward Honolulu Harbor and north toward Auiki Street. Ground elevations range from about four to nine feet above msl. Elevations along the waterfront range from about four to seven feet above msl (USATHAMA 1990). Along the south side, the waterfront is an approximate four-foot-high shoreline of earth and rubble subject to erosion. The remainder of the shoreline, including Snug Harbor and Pier 41, is lined with improved piers.

2.1.1 Climate

Climatological conditions in the Honolulu Harbor are as follows (data from Honolulu International Airport):

TEMPERATURE. From 1997 to 2010, the average annual temperature was of 78˚ F (DBEDT 2010). The extreme temperatures were from 53˚ F (1998) to a high of 94˚ F.

TRADE WINDS. The Hawaiian Islands wind conditions are heavily influenced by its location in the Pacific Ocean. A high-pressure system known as the North Pacific High or Anticyclone is located northeast of Hawaiʻi. Winds spiral out of this system in a clockwise direction. This constitutes the trade winds that blow over the islands from a northeastern direction. These trade winds consistently blow over 80 percent during the summer (May through September) and 50 to 80 percent during the winter (October through April). Because of Hawaiʻi's location, persistent trade winds, and low concentration of industrial pollutants, Hawaiʻi air quality meets or exceeds standards.

AIR QUALITY. DOH maintains two monitoring stations in the area. The closest is at 1039 Sand Island Parkway near the Sand Island State Recreation Area. This station monitors for PM2.5 and O3 from vehicle traffic. A second air monitoring station is located two miles away at 1250 Punchbowl Street, on the roof of DOH's office building. This station monitors for SO2, carbon dioxide (CO2), PM10, PM2. Based on air quality data from these stations, all Federal and State standards are being met.

2.1.2 Soils/Geology

The U.S. Department of Agriculture (USDA) Soils Report (1972) categorizes the site's soil type as "[f]ill land, mixed," consisting of dredged material from the ocean or hauled from nearby areas, garbage and other imported material (SCS 1972). These soils are well drained, have low to moderately low permeability, rarely flood or pond, and are found in urban areas usually near airports, housing areas, and industrial facilities.

The site was formed by two basaltic volcanoes: the Waiʻanae Range on the west and the Koʻolau Range on the east. Lava flows created the land between the two ranges while stream and marine erosion and submersion carved the island's land forms and coastal plains (Stearns 2001). Pre-1920s maps show the Kapālama site as a submerged nearshore area consisting of the Ananoho and Auiki Fishponds (DOT-H February 2007a). The Kapālama site is presently fill land configured along the waterfront to accommodate Honolulu Harbor.

2.1.3 Surface Water

The Kapālama Basin to the south of the site and Keʻehi Lagoon to the west of the site are receiving waters closest to the Proposed Action. Honolulu Harbor is listed in EPA's 303(d) list as an impaired water body24, but total maximum daily loads (TMDLs) have not yet been established. A zone of mixing, which is also regulated by the State under HAR 11-54, is located adjacent to the site in Kapālama Basin. Keʻehi Lagoon is designated Class A marine water, which mean they are protected for recreational purposes and aesthetic enjoyment, and regulated by the State under *Title 11 Hawaiʻi Administrative Rules (HAR), Department of Health, Chapter 54 Water Quality Standards.* The existing site consists of paved areas and buildings. Surface runoff generally sheet flows south toward the Kapālama Basin, or is collected by drain inlets and piped to Kapālama Basin or Keʻehi Lagoon.

2.1.4 Groundwater

There is no potable groundwater resource within the Kapālama site. The groundwater beneath the Kapālama site is highly brackish and unsuitable for potable use.

2.1.5 Land Use

The major harbor-dependent uses were located along the waterfront. These uses included:

- a visitor-oriented ocean recreation company (Atlantis),
- a shipyard repair company (Pacific Shipyards International [PSI]), and
- an ocean research facility (University of Hawaiʻi [UH] Marine Center).

Smaller commercial-industrial tenants in separate individual warehouses were part of the former KMR.

The project site includes submerged lands at Snug Harbor and along the southern property line that abuts the Kalihi Channel. The site is zoned I-3, Waterfront Industrial zone. The submerged areas of the property are within the P-1, Restricted Preservation zone where the zoning intent is "…to include State designated conservation district" (City Land Use Ordinance 39 [LUO]).

2.2 RELEASE BACKGROUND AND HISTORY

The Department of Transportation completed *the Kapalama Container Terminal and Tenant Relocation Final Environmental Impact Statement* (FEIS) in 2014. It provides much of the background information contained within this section and identifies affected environment as result of the demolition activities currently underway. The FEIS identified PCB electrical equipment as potential impacts to the site.

During recent construction activities in November 2014, a release from the transformer area was noticed by HDOT and Pacific Commercial Services (PCS) was called to investigate and remove any remaining fluids inside the transformer unit. PCS removed approximately 150 gallons of transformer oil and tested the fluid. The result of the PCB concentration in the oil was 582 mg/L. Visual staining of the pavement extended to about 1 foot past the 20 ft by 20 ft chain link fence surrounding the transformer unit. The western boundary of the transformer area is the exterior wall of building 905.

Figure 3 - Building 905 Transformer Area

The transformer sits on top of an 8 ft by 10 ft concrete pad and is surrounded by security fencing which is 20 ft by 20 ft in dimension.

3 CONCEPTUAL SITE MODEL

The Conceptual Site Model provides a representation of the possible sources, release and transport mechanisms, media of potential concern, and potential exposure pathways and receptors. The primary source of the PCBs was from the transformer mineral oil which released onto the surrounding concrete and pavement surfaces. Secondary sources and transport media would include concrete, pavement and soil. Media of potential concern would include:

- Liquid residues remaining inside transformer unit
- Concrete pad underlying the transformer unit
- Pavement surrounding the concrete pad
- Soil beneath the pavement
- Concrete wall and footing of adjacent building

Receptors of concern would include humans that may be exposed to media of concern, and may include:

- Removal contractor workers
- Current and future construction workers

Due to the transformer's location and confinement of the release area, there are no potential ecological receptors expected for the site. Potential exposure routes to current of future construction workers would include ingestion and dermal contact.

4 SITE INVESTIGATION AND DATA QUALITY OBJECTIVES

4.1 PROBLEM STATEMENT AND DECISION QUESTION

Since the 1930's, the site has been used for heavy industrial uses and electrical transmission support. Large transformers were position around the site that may have contained PCB transformer oils. During construction activities, a transformer containing greater than 500 ppm PCBs was apparently vandalized and resulted in a release of transformer oil onto to surrounding media adjacent to Building 905. There is visual evidence of a release and testing of the mineral oil indicated PCBs exceeding Toxic Substance Control Act (TSCA) levels (i.e., 50 ppm). Therefore, this site is considered a "high-concentration" "Mineral Oil PCB Transformer" release site. In order to reduce this problem, concrete, pavement and soil will be removed to a depth of 2 feet and laterally, approximately 2 feet outside the fenced area, until the cleanup action level is achieved. Secondarily, the responsible party will need to verify that cleanup is protective of health and environment. This will require that representative samples are collected to verify ground and media are protective of health and the environment.

The principle decision question is … has the source of PCBs and contaminated media been removed to cleanup action levels? The alternative action which may result in response to the question is the source and contaminated media have been adequately removed and verification samples show no further action is required.

4.2 IDENTIFY DATA INFORMATION NEEDS AND BOUNDARIES

Based on the above, the following inputs have been developed:

- Conceptual site Model (CSM)
- One (1) multi-incremental sample (MIS) for verification from the removal area decision unit (DU) TSF-1 (i.e., floor of excavation), plus two replicates.
- Three (3) MIS for the porous surfaces surrounding the concrete pad of the transformer (i.e., asphalt pavement) from DU-PA1, DU-PA2 and DU-PA3.
- Three (3) MIS for confirmation of soil from each wall of the excavation from DU-SSW1, DU-SSW2 and DU-SSW3.
- Three (3) discrete samples (CW-01, CW-02, CW-03) from concrete wall where visible staining was present.

- State of Hawaii Environmental Action Level (EAL)(DOH 2011) for PCB (residential, unrestricted, non-drinking water, and > 150 meters to surface water).

The spatial and temporal components covered by the decision statement are:

- Lateral boundary for removal extends 12 ft from the center of the transformer (or 2 ft past the limits of the security fence), which is 20 ft by 20 ft. The west side is bounded by and existing concrete building wall which is 10 ft from the center of the transformer. The removal area in total is 22 ft wide by 24 ft long, or 528 square feet (sf). See also Figure 4, Site Plan.

- The vertical boundary of the site are the existing concrete pad surface and surrounding asphalt pavement, and soil to a depth of 7 ft below ground surface.

- Total expected removal volume is approximately 170 cy (22'wx24'lx7'h + 25% for expansion) which will be disposed of in a chemical waste landfill approved under 40 CFR 761.75.

- The step-out decision unit boundaries for pavement are five (5) ft wide by various lengths to bound the removal area or step-out decision units (see Figure 5).

- The horizontal or lateral soil boundaries will be 24-inches from the vertical surface of the excavated wall(s).

- The temporal boundary is limited to the time necessary to complete the removal action and verification sampling. The release is considered an event which has ceased.

4.3 DECISION RULES

Decision statements guide the evaluation of the collected data. For this removal action, the decision rules are as follows:

If the true mean concentration of PCBs from each multi-incremental sample media (pavement and soil) and each decision unit is less than the State of Hawaii Unrestricted land use Environmental Action Level (EAL) of 1.1 ppm, then no further removal of pavement or soil is required. Each sample will correspond to the area of the decision unit.

If the decision unit multi-incremental sample equals or exceeds the cleanup EAL of 1.1 ppm, then addition removal of the decision unit boundary will be required; for disposal purposes, the MIS result shall be multiplied by the number of increments to determine the result for disposal purposes. If the result is less than 50 ppm (non-TSCA), then the media can be disposed in the local landfill, otherwise it will be shipped to a chemical waste landfill approved under 40 CFR 761.75.

4.4 STATISTICS FOR DATA EVALUATION

The primary decision statement is to determine whether the PCB concentration of the porous surface and soil in the DU is less than the cleanup level of 1.1 ppm in order to verify the site is protective of human health and environment. In order to make the determination, the collected data must indicate the represented result from DU is below the cleanup level. The alternative is the data result is equal to or greater than the cleanup level and requires additional removal.

The following tolerance limit has been established:

- The detection limits are less than the cleanup level of 1.1 ppm.

In order to ensure the collection of representative samples, the following data collection methods were chosen:

- MIS of soil media (DU-TSF1) will be collected at final depth of excavation after removal of the concrete pad, the pavement around the pad, and the soil beneath.
- MIS of hard porous surface (pavement) will be collected from initial set of three DUs surrounding the lateral limits of removal (DUs-PA1, PA2 and PA3).
- MIS of soil media will be collected from the three vertical walls of the excavation (DUs SSW1, SSW2, and SSW3) to lateral depth of 24-inches.
- MIS of hard porous surface (pavement) will be collected and held for analysis from a set of step-out DUs surrounding the initial DUs surrounding the removal area (DU-PB1, B2, and B3).
- Three discrete hard porous surface samples will be collected from concrete removal area (narrow seam along the building wall) where the transformer oil came in contact with concrete wall.

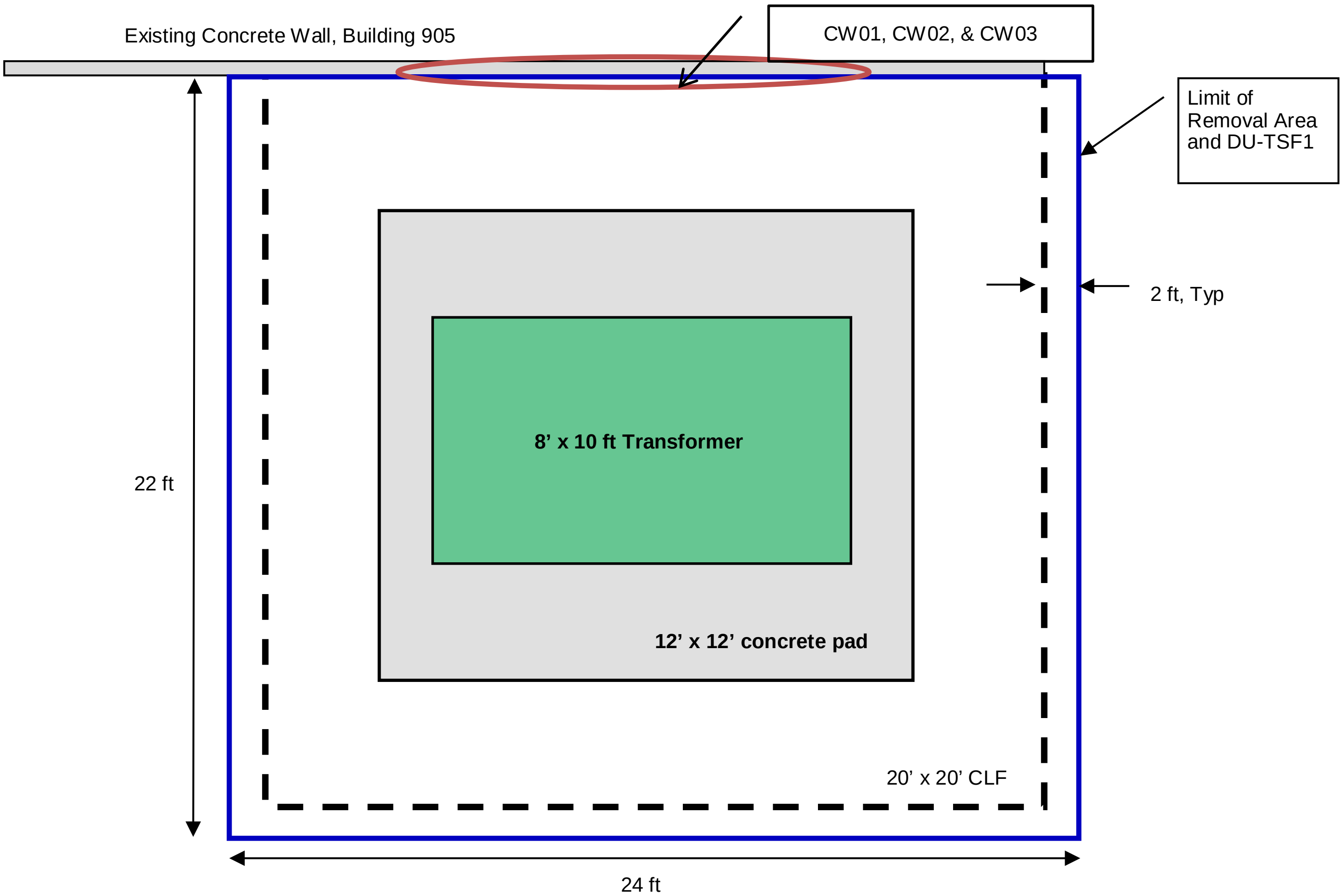

Figure 4 - Site Plan

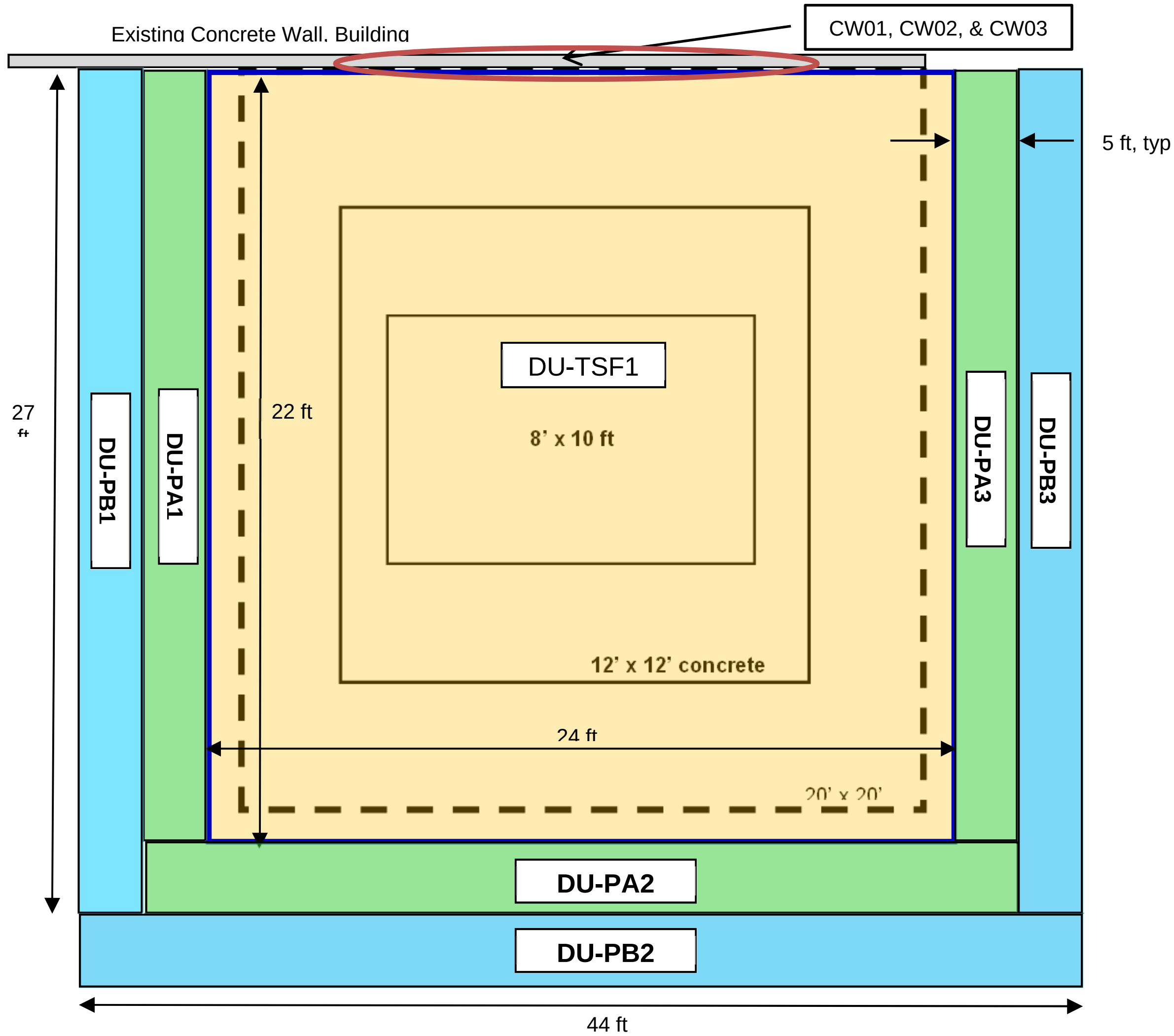

Figure 5 - DU Layout

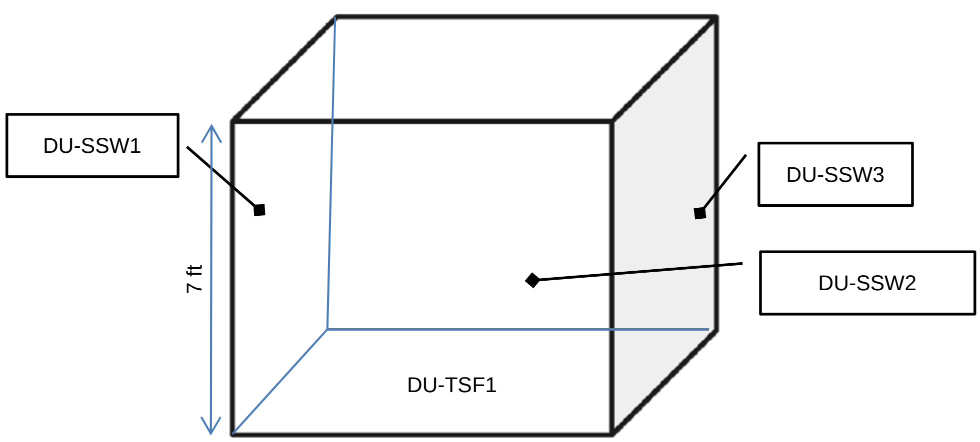

Figure 5a – Vertical Wall DU Layout

5 SCOPE OF WORK

This section describes the work activities for the removal action, the storage methods for media generated, and the verification sampling approach. The primary purpose of the removal action is to remove contaminated media and to verify that the site is protective of human health and environment.

As previously described, a transformer with mineral oil greater than 500 ppm was vandalized and mineral oil was released onto surrounding concrete pad and asphalt pavement surfaces, and potentially soil beneath the porous surfaces. The lateral extent is an area approximately 22 ft by 24 ft (528 sf).

5.1 WORK CONDITIONS, SITE CONTROL AND SECURITY

Work will be performed Monday through Friday during the hours 6:30 am to 6:30 pm. Work shall not be performed during periods of heavy rain or wind conditions that can cause fugitive dust exceeding local standards. An operational control area will be established by the removal contractor and will include room for staging shipping containers, laydown and staging areas for temporary storage of debris and storage of operational equipment. The entire site is currently controlled for demolition and construction activities so additional temporary fencing is not necessary; however, caution tape or other lite barriers (e.g. orange safety cones) will be used to cordon off the area. Plastic sheeting will be placed on the ground whenever contaminated debris or potential for cross-contamination is possible.

Environmental controls will include silt socks around the perimeter of the work area, placing boxes and super sacks directly into shipping container, and covering any exposed potential PCB items or articles with plastic if left exposed to environment. Dust control measures, including watering or covering will be employed when necessary.

5.2 INITIAL REMOVAL ACTION

After the release occurred, HDOT had their emergency response contractor (PCS) pump out the remaining mineral oil fluid. Approximately 150 gallons of fluid was recovered and placed in drums for disposal. The drums were temporarily stored on site in a temporary plastic lined containment area from November 2014 until January 2015 while analytical results were pending and transport could be arranged. A copy of the analytical results and manifest are included in Appendix A. The drums were labeled with the small PCB Mark in accordance with 40 CFR 761.45 and disposal was at an incinerator which complies with 40 CFR 761.70. The NRC Incident Report No. is 1110148.

HDOT initiated removal of all visible traces of the spill on March 9, 2015 and included the following actions and scope:

- Removing the transformer unit from the concrete pad; placing Oil-Dri inside to absorb of any residual fluids; placing the unit on plastic and wrapping it with plastic to contain the carcass; labeling the unit with the PCB marking; placing the wrapped carcass into a shipping container for transport to an approved disposal facility.
- Removing the concrete pad beneath the transformer; breaking the concrete up into smaller pieces and placing debris inside cardboard tri-wall boxes for transport to the approved disposal facility; marking the boxes with the PCB marking.
- Removing the asphalt pavement surrounding the concrete pad to the lateral extents (DU-TSF1) shown in Figure 5, Decision Unit Layout; placing the debris inside cardboard tri-wall boxes for transport to the approved disposal facility; marking the boxes with the PCB marking.
- Excavating soil within the lateral limits of the removal area (DU-TSF1) to a depth of 7 ft and placing soil in super sacks for transport to the approved disposal facility; marking the sacks with the PCB marking.
- Removing the portion of concrete building wall by chipping out oil laden concrete from visibly stained portion of wall; placing the debris inside cardboard tri-wall boxes for transport to the approved disposal facility; marking the boxes with the PCB marking.

All markings for items or containers shall be pursuant to 40 CFR 761.45 and contain either the large or small making format. All packaging and shipping shall be pursuant to DOT requirements under 40 CFR 171 through 180. Tri-wall boxes and super sacks will be stored on-site on pallets and placed directly into the shipping containers daily to avoid contact with environment. The approved chemical waste disposal facility shall be approved under 40 CFR 761.75.

A total of 22 tri-wall boxes of debris consisting of concrete and pavement were generated during initial removal action. A total of 251 super sacks of soil were generated during initial removal action, or approximately 165 cy (assuming density of 1.5 tons per cy). All material was temporarily stored on site on pallets and placed directly into shipping containers each day of generation.

5.3 ADDITIONAL REMOVAL ACTION

If any verification sample result comes back greater than the cleanup action level, additional pavement and soil will be removed to the lateral limits of the step-out DU and handled in a similar manner described above. An additional set of step-out DUs will be created and sampled in accordance with the procedures in Section 6 of this WP and SAP.

Soil and debris from this additional removal action may be disposed in a local non-TSCA landfill, such as PVT Land Company in Nanakuli, Hawaii, provided the MIS result is multiplied by the number of increments (i.e., MIS result x No. of Increments = Result to be used for Disposal). If the calculated result is greater than 50 ppm, the soil will be disposed at the chemical waste landfill approved under 40 CFR 761.75.

5.4 DISPOSAL FACILITIES

The transformer, concrete and pavement, soil and other cleanup wastes, including small PCB transformers associated with the main transformer, or electrical equipment, non-liquid cleaning materials, and/or personal protective equipment waste will be disposed at the following approved chemical waste landfill, unless deemed non-TSCA:

Chemical Waste Management of the NW
17629 Cedar Springs Lane
Arlington, OR 97812
EPA Id # ORD 089452353

Liquid waste will be disposed of at the following approved facility:

Clean Harbors Aragonite, LLC
11600 North Aptus Road
Aragonite, UT 84029
EPA Id # UTD 981552177

Non-TSCA and non-hazardous industrial wastes will be disposed of at:

PVT Land Co
87-2020 Farrington Hwy
Waianae, HI 96792

6 SAMPLING PLAN

This section describes the verification sampling that will be performed after the initial removal action has been conducted. Additionally, this section will describe sample collection methodology, processing, analysis, documentation, equipment decontamination, and handling of investigation-derived waste.

Figures 5 and 5a depict the DU layout for post removal verification. Four DUs will be established to verify that the removal conducted is protective of human health and environment as follows:

> Floor of Excavation (DU-TSF1): This DU is established to verify that the depth of removal is considered adequate. If the MIS PCB result is less than 1.1 ppm, then vertical removal depth is deemed adequate. If results are greater than the cleanup level, an additional one-foot of soil will be removed and verification sampling of the floor of the excavation will be resampled.
>
> Lateral Confirmation, Pavement (DU-PA1 to PA-3): These three (3) DUs are established to verify that the horizontal or lateral extent of pavement removal is adequate. If the pavement MIS results are less than 1.1 ppm, then horizontal removal is deemed adequate.
>
> Lateral Confirmation, Pavement, step out boundary (DU-PB1 to PB3): these three (3) DUs will be established to verify that the horizontal or lateral extent of removal is adequate should the initial set of lateral DU results are greater than the cleanup level.
>
> Lateral Confirmation, Soil (DU SSW1 to SSW3): These three (3) DUs are established to verify that the horizontal or lateral extent of soil removal is adequate. If the soil MIS results are less than 1.1 ppm, then horizontal removal is deemed adequate.
>
> Building Wall Removal Confirmation, Concrete (Discrete samples CW1, CW2 and CW3): three discrete samples will be collected from the narrow seam of concrete removed where transformer oil came into contact with the building wall.

6.1 SAMPLING METHODS AND FIELD EQUIPMENT

In accordance with discussions with Region 9 personnel on the risk-based approval application, MIS methodology is proposed in lieu of statistically based discrete sampling. The objective of MIS is to collect representative samples from each DU. A sample set consists of a minimum of 30 sub-samples or increments collected in a systematic manner whereby each DU will be divided into 3 rows of equal sized cells to form a grid and the sub-sample will be collected from a random location within the grid cell. Samples will be placed in the appropriate, pre-cleaned, labeled sample containers, and placed in a cooler on ice and maintained at approximately 4°C. Field staff will also:

1. Confirm all relevant documentation has been completed, entries are accurate, and paperwork has been signed.
2. Decontaminate all sampling equipment before proceeding to the next sampling location.

6.1.1 Hard Porous Surface Sampling (Concrete and Asphalt Pavement)

The hard porous surfaces will be sampled utilizing a carbide drill bit and an impact hammer or rotary drill (USEPA 2011). Aluminum foil or a paper plate, for example, will be used to collect the drill cuttings from the discrete location or from each of the 30 increments for MIS. Sample increments will be collected at one half-inch to one-inch depth intervals. The accumulated powder on the foil or plate will be placed into a pre-cleaned glass jar with Teflon lined caps.

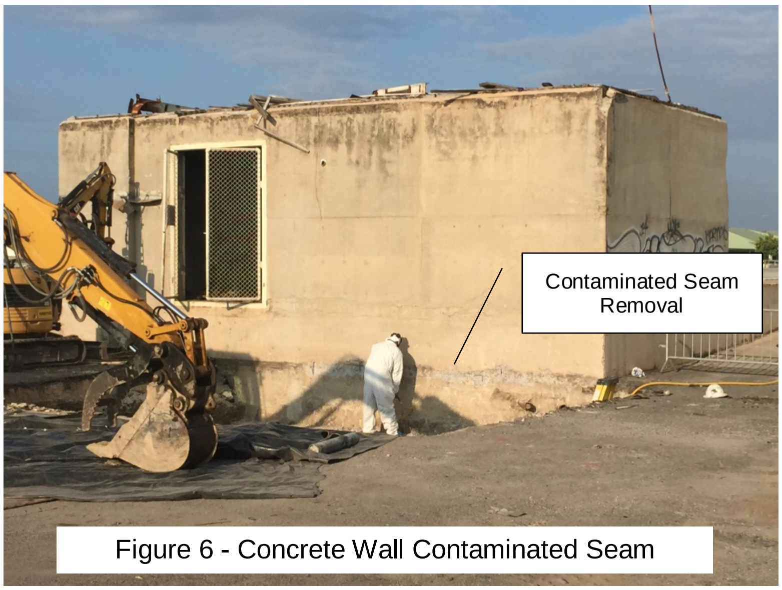

Figure 6 - Concrete Wall Contaminated Seam

Three pavement MIS will be collected (DU-PA1, PA2 and PA3) for initial confirmation boundary and three pavement MIS will be collected (DU-PB1, PB2 and PB3) for secondary confirmation boundary.

Three discrete samples (CW1, CW2, and CW3) will be collected along the narrow seam of the concrete building where visibly stained concrete was removed.

6.1.2 Soil Samples

Each cell from the floor of the excavation will be sampled with a stainless steel trowel or small shovel and placed into a sample container to form the MIS (DU-TSF1).

The vertical wall MIS' (DU-SSW1, SSW2, and SSW3) will be collected utilizing a hand advanced stainless steel sample probe to a depth of 24-inches. A total of fifteen cells will be created and two increments (one form 0" to 6" and one from 18" to 24") will be collected to form the MIS.

6.2 CLEANUP ACTION LEVELS

The cleanup action levels proposed for this project is based on the State of Hawaii Environmental Action Level (DOH 2011) of 1.1 ppm for PCBs with unrestricted land use, located in a non-drinking water area, and greater than 150 meters from surface water. Typically the EPA Regional Screening Level (RSL) of 0.24 ppm, for residential soil, would be used under the EPA risked-based program; however, the EPA has agreed to use local based published action level since the site is located within a heavy industrial area and future land use is intended for industrial use.

6.3 LABORATORY EXTRACTION AND ANALYTICAL PROCEDURES

The laboratory will use the following methods for sample extraction and analysis. The Laboratory Standard Operating Procedure for these methods is included in Appendix B.

6.3.1 Extraction Method

Soil and pavement powder samples will be extracted using the automated Soxhlet extraction method (Method 3541, EXT-3541). The Soxhlet extraction method ensures intimate contact of the sample matrix with the extracted solvent. Extract sample cleanup is discussed in Section 2.2 and 4.2 of the Laboratory SOP. If GPC cleanup is insufficient, cleanup via Method 3660 (Laboratory SOC-3660) may be used for the removal of sulfur.

6.3.2 Analytical Procedure

Samples will be analyzed for PCB congeners by EPA Method 8082A. Chemical preservation is not needed for these samples. The target compounds include the eight Aroclors by single or dual-column analysis systems.

6.4 LABORATORY

All of the testing procedures used during this investigation will be performed in accordance with the most current HDOH and/or EPA guidance, as applicable. Nondetected results will be reported to the method detection limit. A National Environmental Laboratory Accreditation Program-certified laboratory will be used.

The Laboratory proposed for analysis is:

ALS Environmental - Kelso
1317 S. 13th Avenue
Kelso, Washington 98626

6.5 SAMPLE CHAIN-OF-CUSTODY AND TRANSPORTATION

Sample coolers and packing material will be supplied by the analytical laboratories. Individual sample jars will be labeled and placed into plastic bags and sealed. Glass jars will be placed in a manner to prevent breakage and separated in the cooler by bubble wrap or other shock-absorbent material. When a cooler is full, the completed COC form will be placed into a zip-locked bag and taped to the inside lid of the cooler. A temperature blank will be added to each cooler. Each cooler will be sealed with two COC seals, one each on the front and side of the cooler. Coolers containing samples for chemical analyses, bioassays, and bioaccumulation testing will be transported to the appropriate laboratory by courier or overnight shipping service.

After the chemistry samples have been received by the laboratory, they will be stored under refrigeration (4°C) or frozen (–20°C) if an archive chemistry sample.

6.6 SAMPLE IDENTIFICATION

Sample identifiers will be established before field sampling begins and assigned to each sample as it is collected. Sample identifiers consist of codes designed to fulfill three purposes: 1) to identify related samples (i.e., replicate samples) to ensure proper data analysis and interpretation, 2) to obscure the relationships between samples so that the laboratory analysis will be unbiased by presumptive similarities between samples, and 3) to track individual sample containers to ensure that the laboratory receives all of the material associated with a single sample. To accomplish these purposes, each container is assigned a sample number for each container submitted to the analytical laboratory.

The samples will be named by type of sample, location and sample number using the following scheme:

> MI-DU#-Media Type - Sample # (for example, the soil MIS form DU-A1 would become MI-DUA1-SS01)
>
> Replicates will be assigned a sequential number after the primary number.

The label will contain the following:

- Sample number
- Date and time of collection
- Sampler's initials
- Analysis to be performed

6.7 DECONTAMINATION PROCEDURES

The sampling equipment including any compositing bowls and sampling utensils will be thoroughly decontaminated prior to use in accordance with the following two step system.

The sample probes, sleeves, drill bit, or sample equipment will be cleaned between each DU in two steps. The first step will be a bucket filled with potable water and a detergent, such as Alconox. The probe or equipment piece will be scrubbed thoroughly in the first bucket with a stiff brush. The second step will involve rinsing the piece with deionized water and hexane into a second bucket. Each piece will be allowed to dry on a paper towel and inspected prior to its next use.

Sampling personnel will wear disposable nitrile gloves, which will be changed after handling each sample and between sampling stations to prevent cross-contamination.

Mobile or movable equipment or tools or equipment which comes in contact with PCBs may be decontaminated by swabbing the surfaces that have been contacted with PCBs with a solvent and then double washing/rinsing method as follows:

- First Wash: Cover entire surface with concentrated or industrial strength detergent or non-ionic surfactant solution; contain and collect all cleaning solutions for proper disposal; scrub surfaces with scrub brush or pad for at least one minute per 1 square foot making sure surface is always very wet; wipe with clean disposal absorbent pad until surface looks dry.
- First Rinse: rinse off wash solution with one gallon of clean water per square foot and capture for disposal.
- Second Wash: cover entire surface with organic solvent in which PCBs are soluble to at least 5% by weight; contain and collect any runoff solvent; scrub surfaces scrub brush for one minute for each one square foot area; wipe or sorb the solvent onto absorbent material until no visible traces of the solvent remain.
- Second Rinse: wet surface with clean rinse solvent such that entire surface is very wet for one minute; drain and contain the solvent; wipe residual solvent using clean, disposable absorbent pad until no liquid is visible on surface.

6.8 LIST OF EQUIPMENT, CONTAINERS, AND SUPPLIES

Sample aliquots submitted to the laboratory will be placed in pre-cleaned sample containers.

Sample labels will be made of self-adhering, waterproof material. Sample labels will be protected by packaging tape wrapped around the entire jar to prevent loss or damage of the labels during handling and storage.

Equipment to be used for this investigation may include the following:

- Stainless steel sampling sleeve
- Carbide drill bit
- Stainless steel spoon or spade
- Stainless steel bowl
- PPE including nitrile gloves
- Decontamination fluids
- Tape measure
- Camera
- Field log book

6.9 INVESTIGATION DERIVED WASTE

Field personnel will follow procedures and methods described in 40 CFR 761.61(a)(5)(v) whereby non-liquid cleaning materials and personal protective equipment waste at any concentration shall be decontaminated in accordance with 761.79(b) or (c) (see section 6.7 above), or disposed of in an appropriate facility defined in 40 CFR 761.

7 QUALITY ASSURANCE/QUALTY CONTROL PLAN

The purpose of the QAPP is to provide confidence in the project data results through a system of quality control performance checks of field data entry, laboratory analysis and laboratory data reporting, and appropriate corrective actions to achieve compliance with established performance and data quality criteria. This section presents the QA/QC procedures that will be implemented to ensure that the investigation data results are defensible and usable for their intended purpose.

7.1 QUALITY ASSURANCE/QUALITY CONTROL DATA OBJECTIVES

Data quality objectives (DQOs) are qualitative or quantitative statements derived from the planning process. The DQOs are used to clarify the study objectives and define the appropriate type of data to collect to support project decisions. General acceptance or performance criteria for the collection, evaluation, or use of environmental data for this investigation are outlined in Sections 10 and 11 of DOH 2009.

Data quality indicators such as the precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters (USEPA 2002) and analytical sensitivity will be used to assess conformance of data with quality control criteria. PARCC parameters are commonly used to assess the quality of environmental data. Definitions of the PARCC parameters can be found in Section 10.3 of DOH 2009.

7.2 CHAIN OF CUSTODY MAINTENANCE

The integrity of each sample from the time of collection to the point of data reporting must be maintained throughout the study. Samples will be retained in the field team's custody at all times until the samples are transported to the appropriate laboratory. Proper record-keeping and COC procedures will be implemented to allow samples to be traced from collection to final disposition. At the end of each day and prior to shipping or storage, COC forms will be prepared for all samples to ensure that all collected samples are properly documented and traceable through storage, transport, and analysis and will include the following:

- **COC form**—the sample number and tag number of each sample container will be recorded on a COC form. The signed COC form will be secured to the inside top of each cooler identifying the sample collection date and time, the type of sample, the project and the field personnel. The COC form will be sent to the laboratory along with the sample. The COC forms will be completed in triplicate, with one copy retained by the field team lead.

An additional component of the COC process is the use of custody seals during sample shipping. Two custody seals will also be placed across the lid of the cooler prior to shipping.

7.3 DATA REDUCTION AND VALIDATION

Information on sampling locations, dates, water depths, equipment, and other conditions, and sample identifiers will be entered into a project database. One hundred percent of hand-entered data will be verified based on hard copy records. Electronic quality assurance checks to identify anomalous values (approximately 10 percent of the data) will also be conducted following entry.

In addition, laboratory data packages will be provided for chemistry data to allow independent data verification and validation. The chemistry data packages will consist of the sample results followed by a cover letter describing procedures used, analytical problems encountered, qualifiers used, reconstructed ion chromatogram (for gas chromatography/mass spectrometry [GC/MS]), mass spectra of detected target compounds (of GC/MS), chromatograms, quantification reports, and calibration data summaries. Dilution volumes, sample sizes, percent moisture, and surrogate recoveries will be presented on each summary sheet with the analytical results. A similar package will also be assembled for each laboratory quality control sample.

The following types of data will be reviewed:

- Analytical laboratory summary reports including QC summary data for surrogates, method blanks, laboratory control samples, and MS/MSD samples. Acceptance and performance criteria will be developed from the reported laboratory control limits.
- Calibration summary data will be checked to verity that all positive results for target compounds were generated under an acceptable calibration as defined by the analytical method.

7.4 FIELD QUALITY CONTROL CHECKS

Field quality control samples will be used to assess sample variability and to verify that cross contamination between samples has not occurred during sampling. If quality control problems are encountered, corrective actions (if appropriate) will be implemented to meet the data quality specifications. The following quality control samples will be collected in the field and analyzed by the analytical laboratory:

- Blind field replicate samples in triplicate will be collected and analyzed to assess the variability associated with sample processing and laboratory variability. Generally, one replicate sample per 20 samples of each media will be collected. Replicates will be assigned sample IDs and will not be identified as such to the laboratory. One set of replicates (two additional samples from one DU to form a triplicate) will be collected for this project. DU-TSF1 has been chosen for the replicate samples.

- One equipment rinse blank will be collected to help identify possible contamination from the sampling environment or from the sampling equipment. The rinse will be obtained by pouring laboratory-provided distilled water over the sampling equipment after a decontamination event (between samples). The water will be collected in a laboratory-provided jar and analyzed for PCB Aroclors.

7.5 LABORATORY QUALITY CONTROL CHECKS

Extensive and detailed requirements for laboratory quality control procedures are provided in the USEPA, American Society for Testing and Materials (ASTM), and Standard Method protocols that will be used for this study. Every method protocol includes descriptions of quality control procedures, and many incorporate additional quality control requirements by reference to separate quality control chapters in the protocols. Quality control requirements include control limits and requirements for corrective action in many cases. Quality control procedures will be completed by the laboratory, as required in each protocol and as indicated in this SAP.

For chemical analyses, the frequency of analysis of laboratory control samples, MS/MSDs or laboratory duplicates, and method blanks will be 1 for every 20 samples or 1 per extraction batch, whichever is more frequent. Internal standards will be added to every field sample and quality control sample, as required. Calibration procedures will be completed at the frequency specified in each method description. As required by EPA SW-846 methods, performance-based control limits are established by the laboratory. These and all other control limits specified in the method descriptions will be used by the laboratory to establish the acceptability of the data or the need for reanalysis of the samples.

7.6 DATA QUALITY ASSESSMENT

The data validation report will document any issues with laboratory data quality that are identified. Field forms and the log book will be reviewed to ensure that recorded field observations and measurements are consistent with the understanding of the site.

7.7 CORRECTIVE ACTION

If any QC parameters are outside of the control limits or DQO specified in this SAP, the investigation team will identify the potential origin(s) of the problem(s), and initiate any appropriate corrective action. In some cases, the corrective action may involve evaluating potential impacts that these issues have on data quality and therefore usability of the data.

8 DOCUMENTATION AND REPORTING

8.1 FIELD DOCUMENTATION

A complete record of field activities will be maintained.

8.1.1 Field Logbook

Field logbooks must be used to record all daily activities during field sampling events. All modifications, decisions, and/or corrective actions to the study design and procedures identified in this SAP will be discussed with and approved by the project manager prior to field implementation and will be clearly documented in the field logbook.

8.1.2 Field Data Management

Daily field records (a combination of the field logbook and COC forms) will make up the main documentation for field activities. Upon completion of sampling, hard copy notes and forms will be scanned to create an electronic record for use in creating appendices to the data report. Information on sampling locations, dates, water depths, equipment, and other conditions, and sample identifiers will be entered into a project database.

8.2 REMOVAL ACTION REPORT

Data generated by this removal action will be compared with the cleanup levels established for the site (to be determined). Total PCBs will be calculated as the sum of the detected Aroclors. If no Aroclors are detected within a sample, the total PCBs for that sample will be equal to the highest reporting limit for any individual Aroclor in the sample, and the result will be flagged as undetected. In general, the expected cleanup level is 1.1 ppm for soil, pavement and concrete.

The chemistry data will be presented in tables and mapped, and concentrations with qualifiers as appropriate, and exceedances of the criterion. A draft data report will be prepared with the following information:

1. Introduction
2. Deviations from this WP/SAP
3. Maps showing proposed and actual sampling locations, data results, and spatial contours
4. Data tables (validated chemistry)
5. Data validation reports, as appropriate.
6. Recommendations for site closure

9 SCHEDULE

The tentative schedule for the proposed field activities and deliverables is as follows:

Task	Proposed Date
Field planning	Concurrent with EPA review
Field mobilization and sampling	Within 15 days of acceptance by EPA
Sample analysis	Within 14 days of sampling
Data validation	Within 7 days of receipt of analysis
Removal Action Report	Within 14 days of completion of data validation

10 REFERENCES

Hawai'i Department of Health. 2009. Technical Guidance Manual for the Implementation of the Hawai'i Contingency Plan. Interim Final. November 12, 2009.

Hawai'i Department of Health. 2011. Evaluation of Environmental hazards at Sites with Contaminated Soil and Groundwater.

USEPA. 2002. Guidance on environmental data verification and validation. EPA QA/G-8. U.S. Environmental Protection Agency, Office of Environmental Information, Washington, DC.

USEPA. 2011. Standard Operating Procedure for Sampling Porous Surfaces for Polychlorinated Biphenyls (PCBs). Environmental Protection Agency, Region 1, Boston, MA.

State of Hawaii, Department of Business, Economic Development, and Tourism (DBEDT). *State of Hawaii Data Book 2010*. http://hawaii.gov/dbedt/info/economic/databook/db2010/

State of Hawaiʻi Department of Transportation-Harbors Division (DOT-H). 1991. *Final Master Plan Report, Kapalama Development Project.*

State of Hawaiʻi Department of Transportation-Harbors Division (DOT-H). 2014. *Final Environmental Impact Statement. Kapalama Container Terminal and Tenant Relocation.*

U. S. Department of Agriculture, Soil Conservation Service (SCS). 1972. *Soil Survey Report of Oahu.*

U.S. Army Toxic and Hazardous Materials Agency (USATHAMA). February 1990. *Task Order 2 Enhanced Preliminary Assessment. Kapalama Military Reservation Honolulu, Hawaii.*
Prepared by Roy F. Weston, Inc.

APPENDIX A

MINERAL OIL ANALYTICAL RESULTS AND MANIFEST RECORD

ESN Pacific Inc.
Environmental Services Network

December 4, 2014

Jingbo Chang
Pacific Commercial Services, LLC
PO Box 235117
Honolulu, HI 96823

SUBJECT: DATA REPORT – 300099-02, Kapalama Military Reservation, 5 Sand Island Access Road, Honolulu, HI

ESN Project # D1411240482

Mr. Chang:

Please find enclosed a data report for the samples analyzed from the above referenced project for Pacific Commercial Services, LLC. The samples were received intact. Applicable detection limits, QA/QC data, and any issues encountered during analysis are included in the report.

The following tests were conducted:

- Analyses for polychlorinated biphenyls by EPA 8082 mod.

ESN appreciates the opportunity to have provided analytical services to Pacific Commercial Services, LLC on this project. If you have any further questions relating to the data or report, please do not hesitate to contact us.

Sincerely,

Karen Carvallo

Karen Carvallo
Operations Manager

ESN Pacific
2020-B Kahai Street
Honolulu, HI 96819

Ph: (808) 847-0067
esn@esnpacific.com

ESN PACIFIC'S CHAIN-OF-CUSTODY RECORD

CLIENT: PACIFIC COMMERCIAL SERVICES LLC

ADDRESS: PO BOX 235117, HONOLULU, HI 96823

PHONE: 808-545-4599 FAX: 808-845-9773

EMAIL: Jingbo.chang@pcshi.com

CLIENT PROJECT #: 300099-02 Project Manager: Jingbo Chang

TAT (circle one): 24-hr. 48-hr. 5-day or Other:______

DATE: 11/24 /14 PAGE 1 OF ___

ESN PROJECT #: D1411240482

LOCATION/PROJECT NAME: Kapalama Military Reservation, 5 Sand Island Access Rd, Honolulu, HI

COLLECTOR: DATE COLLECTED: 11/24/2014

	Sample ID#	Depth	Time	Sample Type	Container Type	8260 HVOC ext 5035? Y N	8260 VOC ext 5035? Y N	8260 BTEX ext 5035? Y N	8260 MtBE ext 5035? Y N	8015 Fuel Scan only	8015 TPH-Gas ext 5035?	8015 TPH-Diesel	8015 TPH-Oil	8081 Chlor. Pesticides	8082 PCB	8270 PAH DOH-4	Reactivity	Corrosivity	1010 FlashPoint (Ignitibility)	RCRA 8 Metals	Dissovled RCRA 8 Metals	TCLP As, Cd, Cr, Pb	TCLP pesticides	TCLP Herbicides	TCLP VOC	TCLP SVOCs	Comments	# of Containers
1	KMR-T-01			Grab	Glass										X												SN:	1
2																												
3																												
4																												
5																												
6																												
7																												
8																												
9																												
10																												
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14																												
15																												
16																												
17																												
18																												
19																												
20																												

RELINQUISHED BY:(Signature)	DATE/TIME	RECIEVED BY (Signature)	DATE/TIME
[signature]	11-24/14	[signature]	11/24
RELINQUISHED BY:(Signature)	DATE/TIME	RECIEVED BY (Signature)	DATE/TIME

SAMPLE RECEIPT:

TOTAL # OF CONTAINERS______

COC SEALS Y / N / NA

SEALS INTACT Y / N / NA

RECEIVED TEMP:______

LABORATORY NOTES:

SAMPLE DISPOSAL INSTRUCTIONS: ____ ESN @ $5.00/sample or ____ Return to Client

ESN Pacific Inc.

Environmental Services Network

PCS - Pacific Commercial Services PROJECT #300099-02
Kapalama Military Reservation, 5 Sand Island Access Road, Honolulu, HI

ESN Project #D1411240482

PCB ANALYSES OF OILS BY EPA 8082 MODIFIED

SAMPLE NUMBER	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	PCB-1016 (mg/L)	PCB-1221 (mg/L)	PCB-1232 (mg/L)	PCB-1242 (mg/L)	PCB-1248 (mg/L)	PCB-1254 (mg/L)	PCB-1260 (mg/L)	SURROGATE RECOVERY(%)	FLAGS
Method Blank	-	11/25/2014	12/1/2014	nd	nd	nd	nd	nd	nd	nd	109%	
KMR-T-01	11/24/2014	11/25/2014	12/1/2014	nd	nd	nd	nd	nd	nd	582	DO	DF 100
PQL				0.50	1.00	1.00	0.25	0.25	0.25	0.25		
MDL				0.25	0.75	0.50	0.20	0.10	0.20	0.20		

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (TCMX): 65% - 135%

DF: Reported result calculated from dilution factor, multiply detection limit by dilution factor.
DO: Diluted out.

QA/QC DATA - LABORATORY CONTROL SPIKE ANALYSES

	PCB-1016	PCB-1260
Spike Added	5.00	5.00
Measured Conc.	4.58	5.14
% Recovery	91.6%	102.8%
Spike Added	5.00	5.00
Measured Conc.	5.36	5.74
% Recovery	107.2%	114.7%
RPD	15.7%	10.9%

% Recovery LIMITS: 80% TO 120%
RPD LIMIT: 20%

ANALYSES PERFORMED AND REVIEWED BY : K. Carvallo

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

GENERATOR

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Manifest Tracking Number
HI7 214 522 214	2	1-800-645-8265	007245741 JJK

5. Generator's Name and Mailing Address
STATE OF HAWAII DOT-HARBORS DIVISION
79 S NIMITZ HWY ATTN: ALAN LEE
HONOLULU, HI 96813
Generator's Phone: 808-356-5391

Generator's Site Address (if different than mailing address)
HIC300099-02-01
1845 AUIKI STREET
HONOLULU, HI 96819

6. Transporter 1 Company Name
PACIFIC COMMERCIAL SERVICES, LLC. 808-545-4599
U.S. EPA ID Number: HID 982 040 578

7. Transporter 2 Company Name
MATSON NAVIGATION COMPANY 800-962-8766
U.S. EPA ID Number: CAD006912620

8. Designated Facility Name and Site Address
CLEAN HARBORS ARAGONITE, LLC
11600 NORTH APTUS ROAD
ARAGONITE, UT 84029
Facility's Phone: 435-884-8100
U.S. EPA ID Number: UTD981552177

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
X	1. RQ, UN2315, POLYCHLORINATED BIPHENYLS, LIQUID, 9, PGII 'MARINE POLLUTANT' (TRANSFORMER OIL)	003	DM	00600	K	NON-RCRA
	2.					
	3.					
	4.					

14. Special Handling Instructions and Additional Information
9b1: PCB Liquid CH 933259 55G 2012 9b1: 171 SEND COPY TO:
9b2: * OSD: 11/24/14 ERG# 9b2: PCS LLC
9b3: * DO/JOE 9b3: P.O. BOX 235117
9b4: * 300099 9b4: HONOLULU, HI 96823

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: DEREK KOKI Signature: [signature] Month 1 Day 21 Year 15

INT'L

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: JAKE KAAWALOA Signature: Jake K[signature] Month 1 Day 21 Year 15
Transporter 2 Printed/Typed Name: Signature: Month Day Year

DESIGNATED FACILITY

18. Discrepancy
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
18b. Alternate Facility (or Generator) U.S. EPA ID Number
Facility's Phone:
18c. Signature of Alternate Facility (or Generator) Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. 2. 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name Signature Month Day Year

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST (Continuation Sheet)	21. Generator ID Number	22. Page	23. Manifest Tracking Number
	HI7 214 522 214	2	007245741JJK

24. Generator's Name

HIC300099-02-01

STATE OF HAWAII DOT-HARBORS DIVISION

25. Transporter 3 Company Name CLEAN HARBORS ENVIRONMENTAL SVC. U.S. EPA ID Number MAD039322250

26. Transporter 4 Company Name CLEAN HARBORS ENVIRONMENTAL SVC. U.S. EPA ID Number MAD039322250

27a. HM	27b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	28. Containers No.	28. Containers Type	29. Total Quantity	30. Unit Wt./Vol.	31. Waste Codes

32. Special Handling Instructions and Additional Information

GENERATOR

TRANSPORTER

33. Transporter ______ Acknowledgment of Receipt of Materials

Printed/Typed Name | Signature | Month | Day | Year

34. Transporter ______ Acknowledgment of Receipt of Materials

Printed/Typed Name | Signature | Month | Day | Year

DESIGNATED FACILITY

35. Discrepancy

36. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

APPENDIX B

LABORATORY SOP AND DETECTION LIMITS

PCBS AS AROCLORS

METHOD 8082A

ALS-KELSO

SOPID:	SOC-8082Ar	Rev. Number:	16	Effective Date:	06/30/2013

Approved By: Lorn E Portwood Date: 6/26/13
Department Supervisor - Loren Portwood

Approved By: Suzanne LeMay Date: 6/26/13
QA Manager - Suzanne LeMay

Approved By: Date: 6/26/13
Laboratory Director - Jeff Grindstaff

Issue Date:	___________	Doc Control ID#:	___________	Issued To:	___________

STANDARD OPERATING PROCEDURE

for

PCBS AS AROCLORS

1. SCOPE AND APPLICATION

This procedure is used to determine the concentrations of PCBs as Aroclors using EPA Method 8082A. This procedure is typically applied to water, sediment, and soil matrices but may also be applicable to tissue or various miscellaneous waste samples. Table 1 lists the analytes that are determined by this procedure and lists the method reporting limits (MRLs) for each compound in water and soil. Equivalent nomenclature for MRL includes Estimated Quantitation Limit (EQL). Therefore, MRL=EQL. The reported MRL may be adjusted if required for specific project requirements; however, the capability of achieving other reported MRLs must be demonstrated. Method Detection Limits that have been achieved are given in Table 1. MDLs may change as repeat studies are conducted.

2. METHOD SUMMARY

2.1. This procedure provides gas chromatographic conditions for the detection of parts-per-billion (ppb) levels of PCBs. The target PCBs are extracted from samples using the appropriate procedure for the sample matrix (see applicable SOP), analyzed, and reported as Aroclors. Liquid samples are extracted using solid phase extraction (Method 3535, EXT-3535). Liquid samples containing solid material may be extracted by continuous liquid-liquid extraction (Method 3520, EXT-3520). Soil/sediment samples are extracted using Soxhlet (Method 3540, EXT-3540), automated Soxhlet extraction (Method 3541, EXT-3541) or by Ultrasonic extraction (Method 3550, EXT-3550). An aliquot of the extract is injected into the gas chromatograph (GC). The compounds are separated on a fused silica capillary column. Compounds of interest are detected by an electron capture detector. Identification of the analytes of interest is performed by comparing the retention times of the analytes with the respective retention times of an authentic standard and by comparison of elution patterns to those of Aroclor standards. Quantitative analysis is performed by using the authentic standard to produce a calibration factor or calibration curve, and using the calibration data to determine the concentration of an analyte in the extract. The concentration in the sample is calculated using the sample weight or volume and the extract volume.

2.2. The sensitivity of this method usually depends on the level of interferences rather than on instrument limitations. If interferences prevent detection of the analytes, GPC, florisil column cleanup, sulfur cleanup, or concentrated sulfuric acid cleanups are used to eliminate interferences in the analysis. Refer to section 4.2 for cleanup procedure references.

2.3. In cases where there is a project-specific quality assurance plan (QAPP), the project manager identifies and communicates the QAPP-specific requirements to the laboratory. In general, project specific QAPP's supersede method specified requirements. An example of this are projects falling under DoD ELAP. QC requirements defined in the SOP *Department of Defense*

Projects – Laboratory Practices and Project Management (ADM-DOD) may supersede the requirements defined in this SOP.

3. DEFINITIONS

3.1. **Analysis Sequence** - Samples are analyzed in a set referred to as an analysis sequence. The sequence begins with instrument calibration followed by sample extracts interspersed with calibration standards. The sequence ends when the set of samples has been injected or when qualitative and/or quantitative QC criteria are exceeded.

3.2. **Batch** - A batch of samples is a group of environmental samples that are prepared and/or analyzed together as a unit with the same process and personnel using the same lot(s) of reagents. It is the basic unit for analytical quality control.

3.2.1. Preparation Batch - A preparation batch is composed of one to twenty field samples, all of the same matrix, and with a maximum time between the start of processing of the first and last samples in the batch to be 24 hours.

3.3. Analysis Batch - Samples are analyzed in a set referred to as an analysis sequence. The sequence begins with instrument calibration (initial or continuing verification) followed by sample extracts interspersed with calibration standards (CCBs, CCVs, etc.) The sequence ends when the set of samples has been injected or when qualitative and/or quantitative QC criteria indicate an out-of-control situation.

3.4. **Sample**

3.4.1. Field Sample - An environmental sample collected and delivered to the laboratory for analysis; a.k.a., client's sample.

3.4.2. Laboratory Sample - A representative portion, aliquot, or subsample of a field sample upon which laboratory analyses are made and results generated.

3.5. **Quality System Matrix** - The *matrix* of an environmental sample is distinguished by its physical and/or chemical state and by the program for which the results are intended. The following sections describe the matrix distinctions. These matrices shall be used for purpose of batch and quality control requirements.

3.5.1. Aqueous - Any groundwater sample, surface water sample, effluent sample, and TCLP or other extract. Specifically excluded are samples of the drinking water matrix and the saline/estuarine water matrix.

3.5.2. Drinking water - Any aqueous sample that has been designated a potable or potential potable water source.

3.5.3. Saline/Estuarine water - Any aqueous sample from an ocean or estuary or other salt-water source.

3.5.4. Nonaqueous Liquid - Any organic liquid with <15% settleable solids.

3.5.5. Animal tissue - Any tissue sample of an animal, invertebrate, marine organism, or other origin; such as fish tissue/organs, shellfish, worms, or animal material.

3.5.6. Solids - Any solid sample such as soil, sediment, sludge, and other materials with >15% settleable solids.

3.5.7. Chemical waste - Any sample of a product or by-product of an industrial process that results in a matrix not described in one of the matrices in Sections 3.3.1 through 3.3.6. These can be such matrices as non-aqueous liquids, solvents, oil, etc.

3.5.8. Miscellaneous matrices – Samples of any composition not listed in 3.3.1 – 3.3.7. These can be such matrices as plant material, paper/paperboard, wood, auto fluff, mechanical parts, filters, wipes, etc. Such samples shall be batched/grouped according to their specific matrix.

3.6. Matrix Spike/Duplicate Matrix Spike (MS/DMS) Analysis - In the matrix spike analysis, predetermined quantities of target analytes are added to a sample matrix prior to sample preparation and analysis. The purpose of the matrix spike is to evaluate the effects of the sample matrix on the method used for the analysis. Duplicate samples are spiked, and analyzed as a MS/DMS pair. Percent recoveries are calculated for each of the analytes detected. The relative percent difference (RPD) between the duplicate spikes (or samples) is calculated and used to assess analytical precision. The concentration of the spike should be at the mid point of the calibration range or at levels specified by a project analysis plan.

3.7. Laboratory Duplicates (DUP) – Duplicates are additional replicates of samples that are subjected to the same preparation and analytical scheme as the original sample. The relative percent difference (RPD) between the sample and its duplicate is calculated and used to assess analytical precision.

3.8. Surrogate - Surrogates are organic compounds which are similar to analytes of interest in chemical composition, extraction and chromatography, but which are not normally found in environmental samples. The purpose of the surrogates is to evaluate the preparation and analysis of samples. These compounds are spiked into all blanks, standards, samples and spiked samples prior to extraction and analysis. Percent recoveries are calculated for each surrogate.

3.9. Method Blank (MB) - The method blank is an artificial sample composed of analyte-free water or solid matrix and is designed to monitor the introduction of artifacts into the analytical process. The method blank is carried through the entire analytical procedure.

3.10. Laboratory Control Samples (LCS) – The LCS is an aliquot of analyte free water or analyte free solid to which known amounts target analytes are added. The LCS is prepared and analyzed in exactly the same manner as the samples. The percent recovery is compared to established limits and assists in determining whether the batch is in control.

3.11. Independent Verification Standard (ICV) - A mid-level standard injected into the instrument after the calibration curve and prepared from a different source than the initial calibration standards. This is used to verify the validity of the initial calibration standards

3.12. Continuing Calibration Verification Standard (CCV) - A mid-level standard analyzed at specified intervals. Used to verify that the initial calibration curve is still valid for quantitative purposes.

3.13. Instrument Blank (CCB) - The instrument blank (also called continuing calibration blank) is a volume of clean solvent analyzed on each column and instrument used for sample analysis. The purpose of the instrument blank is to determine the levels of contamination associated with the instrumental analysis itself, particularly with regard to the carry-over of analytes from standards or highly contaminated samples into subsequent sample analyses.

3.14. Duplicates and Duplicate Matrix Spikes are additional replicates of samples that are subjected to the same preparation and analytical scheme as the original sample. Depending on the method of analysis, either a duplicate analysis (and/or a matrix spiked sample) or a matrix spiked sample and duplicate matrix spiked sample (MS/DMS) are analyzed.

3.15. Standard Reference Material (SRM) – A material with specific certification criteria and is issued with a certificate or certificate of analysis that reports the results of its characterizations and provides information regarding the appropriate use(s) of the material. An SRM is prepared and used for three main purposes: (1) to help develop accurate methods of analysis; (2) to calibrate measurement systems used to facilitate exchange of goods, institute quality control, determine performance characteristics, or measure a property at the state-of-the-art limit; and (3) to ensure the long-term adequacy and integrity of measurement quality assurance programs.

4. INTERFERENCES

4.1. Interferences by phthalate esters can pose a major problem in PCB determinations when using the electron capture detector. These compounds generally appear in the chromatogram as large, late-eluting peaks, especially in the 15% and 50% fractions from the florisil cleanup. Common flexible plastics contain varying amounts of phthalates. These phthalates are easily extracted or leached from such materials during laboratory operations. Phthalate contamination is not usually a problem in our laboratory operation.

4.2. Co-extractables such as lipids, waxes, etc., can be removed via GPC cleanup (SOC-3640A). Certain fractionization cleanups can be used to selectively remove organochlorine pesticides, aiding in Aroclor determination (SOC-3665). The presence of elemental sulfur will result in interferences for most Aroclors. If GPC cleanup is insufficient, cleanup via Method 3660 (SOC-3660) may be used for the removal of sulfur.

4.3. A standard of the DDT analogs should be injected with each initial calibration to determine which of the PCB or Aroclor peaks may be subject to interferences on the analytical columns used. There may be substantial DDT interference with the last major Aroclor 1254 peak in some soil and sediment samples.

5. SAFETY

5.1. The toxicity or carcinogenicity of each compound or reagent used in this method has not been precisely determined; however, each chemical compound should be treated as a potential health hazard. Exposure to these compounds should be reduced to the lowest possible level.

5.2. Follow all applicable safety procedures as described in the ALS Safety Manual. A reference file of material safety data sheets is available to all personnel involved in these analyses. ALS also maintains a file of OSHA regulations regarding the safe handling of the chemicals specified in this method.

6. SAMPLE COLLECTION, CONTAINERS, PRESERVATION, AND STORAGE

6.1. Containers used to collect samples should be purchased pre-cleaned containers. Alternatively, containers may be soap and water washed followed by methanol (or isopropanol) rinsing. The sample containers should be of glass or teflon and have screw-top covers with teflon liners. In situations where teflon is not available, solvent-rinsed aluminum foil may be used as a liner. Highly acidic or basic samples may react with the aluminum foil, causing eventual contamination of the sample. Plastic containers or lids may <u>not</u> be used for the storage of samples due to the possibility of sample contamination from the phthalate esters and other hydrocarbons within the plastic.

6.2. Sample containers should be filled with care so as to prevent any portion of the collected sample coming in contact with the sampler's gloves, thus causing contamination. Samples should not be collected or stored in the presence of exhaust fumes. If the sample comes in contact with the sampler (e.g., if an automatic sampler is used), run reagent water through the sampler and use the rinseate as a field blank.

6.3. Samples should be tested for residual chlorine at the time of sampling. For aqueous samples with residual chlorine present, add 3-mL 10% sodium thiosulfate solution per gallon (0.008%).

6.4. Water and soil samples must be iced or refrigerated at 4 ± 2ºC from time of collection until extraction. Tissue samples should be stored in accordance with project requirements, typically refrigerated or frozen.

6.5. There are no holding time requirements for this method.

7. APPARATUS AND EQUIPMENT

7.1. Gas Chromatograph (GC)

7.1.1. Analytical system complete with gas chromatograph suitable for splitless or on-column automated injection into a wide bore capillary column with an electron capture detector (ECD). Use of Large Volume Injection (LVI) is optional. Helium is used as the carrier gas; argon/methane mixture is used for the detector makeup gas (auxiliary gas). Current instrumental systems are identified as follows:

Instrument I.D.	Analytical System	Routine Matrix
GC22	Agilent 6890	Water-LL/Tissue/Soil
GC32	Agilent 6890	Water/Soil/Tissue

7.1.2. GC Autosampler: The GC system should be configured with a compatible autosampler for automated injection of standards, samples, and QC samples.

7.1.3. GC Columns - fused silica capillary columns
Column 1: DB-35MS, 30-m x 0.53mm, 1.0um film thickness, or equivalent.
Column 2: DB-XLB, 30-m x 0.53mm, 1.5um film thickness, or equivalent.

Note: Column diameter and film thickness varies depending on the column. Refer to the instrument maintenance logbook for the column used for a specific instrument configuration.

7.1.4. Data System - A computer data system must be interfaced to the GC/ECD. The system allows the continuous acquisition and storage on machine-readable media of chromatographic data obtained throughout the duration of the analysis program. The computer must have software that includes automated calibration, identification, and quantitation routines. The software must also be capable of integrating the chromatographic peaks abundances. The current version of the manufacturer's software is preferred (Target or HP Chemstation/Enviroquant).

8. STANDARDS, REAGENTS, AND CONSUMABLE MATERIALS

8.1. Solvents: Hexane, acetone, methylene chloride, isooctane, and methanol. Pesticide grade or equivalent.

8.2. Standards

8.2.1. Stock standard solutions may be purchased from a number of vendors. All reference standards, where possible, must be traceable to SI units or NIST certified reference materials.

8.2.2. Aroclor stock standard solutions are purchased from AccuStandard at 1000 ug/mL. Other vendors may be used providing they meet the requirements in sec 8.2.1. Transfer stock standard solutions into Teflon-sealed screw-cap bottles. Stock standard solutions are stored at -10ºC, or at ambient temperature as recommended by the vendor, and protected from light. The expiration date for unopened ampules is the manufacturer's assigned expiration date. If the manufacturer does not assign a date, an expiration date of 1 year from receipt is assigned. Check stock standards frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

8.2.2.1. Intermediate Aroclor calibration standard solutions are made by diluting 1000 ug/mL stock standards 1:20 in hexane. An intermediate surrogate standard is prepared at 5ug/mL by diluting the stock 1:40 in hexane.

8.2.2.2. Prepare calibration standards at a minimum of five concentration levels containing equal concentrations of both Aroclors 1016 and 1260 by dilution of the intermediate standards with hexane. One of the concentration levels should be at or below a concentration representing the method reporting limit (MRL). The remaining concentration levels should correspond to the expected range of concentrations found in real samples or should define the working range of the GC. See Table 4 for preparation and concentrations, including standards designated as CCVs. A calibration standard of mid-range concentration is used for the CCV.

8.2.2.3. Calibration standard solutions are stored at 4 ± 2ºC and must be replaced after six months, or sooner, if comparison with check standards indicate a problem.

8.2.3. The independent calibration verification (ICV) standards are prepared purchased from Ultra Scientific at 100 ug/mL. Other vendors may be used providing they meet the requirements in sec 8.2.1. ICV solutions are stored at -10ºC, or at ambient temperature as recommended by the vendor, and protected from light. The expiration date for unopened ampules is the manufacturer's assigned expiration date. If the manufacturer does not assign a date, an expiration date of 1 year from receipt is assigned.

8.2.3.1. Working ICV standards at 1000 ug/mL are prepared as described in Table 4.

8.2.4. Surrogate solutions are prepared from stock solutions purchased from Ultra Scientific at 200 ugmL. Other vendors may be used providing they meet the requirements in sec 8.2.1.

8.2.4.1. The procedure for adding the surrogate solution to the calibration standards is outlined in Table 4.

8.2.4.2. A surrogate spiking solution is prepared at 2 ug/mL by making a 1:100 dilution of the surrogate stock standard in acetone. The surrogate solution is stored in the refrigerator for up to six months.

8.2.5. Standards of the other Aroclors are prepared for use as retention time/pattern standards and to establish calibration factors for these Aroclors (see Table 4).

8.2.6. Matrix spike solution: Prepare a spiking solution at 40 ug/mL containing both Aroclor 1016 and 1260 by diluting the 1000 ug/mL stock standards 1:25 with acetone.

9. PREVENTIVE MAINTENANCE

9.1. All maintenance activities are recorded in a maintenance logbook kept for each instrument. Pertinent information (serial numbers, instrument I.D., etc.) must be in the logbook. This includes the routine maintenance described in section 9. The entry in the log must include: date of event, the initials of who performed the work, and a reference to analytical control.

9.2. Carrier gas - Inline purifiers or scubbers should be in place for all sources of carrier gas. These are selected to remove water, oxygen, and hydrocarbons. Purifiers should be changed as recommended by the supplier.

9.3. Gas Chromatograph

9.3.1. Whenever GC maintenance is performed, care should be taken to minimize the introduction of air or oxygen into the column. Injection port maintenance includes changing the injection port liner, seal, washer, o-ring, septum, column ferrule, and autosampler syringe as needed. Liners and seals should be changed when recent sample analyses predict a problem with chomatographic performance. In some cases liners and seals may be cleaned and re-used.

9.3.2. Clipping off a small portion of the head of the column often improves chromatographic performance. When cutting off any portion of the column, make sure the cut is straight and “clean” (uniform, without fragmentation) by using the proper column cutting tool.

9.3.3. Over time, the column will exhibit poorer overall performance, as contaminated sample matrices are analyzed. The length of time for this to occur will depend on the samples analyzed. When a noticeable decrease in column performance is evident and other maintenance options do not result in improvement, the column should be replaced. This is especially true when evident in conjunction with calibration difficulties.

10. RESPONSIBILITIES

10.1. It is the responsibility of the analyst to perform the analysis according to this SOP and to complete all documentation required for data review. Analysis and interpretation of the results are performed by personnel in the laboratory who have demonstrated the ability to generate acceptable results utilizing this SOP. This demonstration is in accordance with the training program of the laboratory. Final review and sign-off of the data is performed by the department supervisor/manager or designee.

10.2. It is the responsibility of the department supervisor/manager to document analyst training. Documenting method proficiency, as described in 8082A, is also the responsibility of the department supervisor/manager.

11. PROCEDURE

11.1. Sample Preparation

11.1.1. Water samples (1L) are extracted at a pH of 5-9 with methylene chloride, using Method 3520 (EXT-3520) or using solid phase extraction (EXT-3535). Refer to the applicable extraction SOP. For extraction by 3535, acidification of the sample prior to extraction may be allowable if project objectives and performance requirements of methods 3535 and 8081 are met. An ultra low-level water option may be used, where a 1L sample amount and a final extract volume of 2mL is used. Large Volume Injectors are typically used with this option.

Note: Project-specific or regulation-specific extraction methods may apply. For projects originating from South Carolina and under the SC DHEC lab certification, use the 3520 extraction method only.

11.1.2. Soil/sediment samples are extracted using either EPA Method 3540 (EXT-3540), EPA Method 3541 (EXT-3541) or EPA Method 3550 (EXT-3550). Refer to the applicable extraction SOP. A low-level sediment option may be used where the sample weight of 40g (20g dry weight) and a final extract volume of 4mL are used.

11.1.3. Additional sample cleanup procedures may be employed as appropriate for the samples. Refer to the section on interferences and the appropriate ALS SOP.

11.2. Calibration

Note: The calibration procedure(s) and options chosen must follow the ALS protocols. Any exceptions to the calibration procedures detailed in SOC-CAL, *Calibration of Instruments for Organics Chromatographic Analyses* are described as follows:

Note: Certain state or program protocols have specific procedures for calibration. The analyst must ensure that the correct procedures are used. Known exceptions are as follows:

- The use of quadratic regression calibration is not allowed for projects (samples) originating from South Carolina and under the SC DHEC lab certification.

11.2.1. Prepare a minimum of 5 calibration standards containing equal concentrations of both Aroclor 1016 and 1260 by dilution of the stock standard(s) with isooctane or hexane. Single standards of each of the other target Aroclors are required to aid the analyst in pattern recognition. Once the linearity of the detector has been demonstrated using Aroclor 1016/1260 standards, the single standards of the remaining target Aroclors are also used to determine the calibration factor for each Aroclor. Prepare a standard for each of the other Aroclors. The concentrations should correspond to the mid-point of the linear range of the detector.

Note: DoD QSM requires the quantitation for Aroclors must be performed using a 5-point calibration. Results may not be quantitated using a single point.

A minimum of 3 peaks must be chosen for each Aroclor, and preferably 6 peaks. The peaks must be characteristic of the Aroclor in question. Choose peaks in the Aroclor standards that are at least 25% of the height of the largest Aroclor peak and does not coelute with any of the DDT analogs. For each Aroclor, the set of 3 to 6 peaks should include at least one quantitation peak that is unique to that Aroclor. Use at least five peaks for the Aroclor 1016/1260 mixture, none of which should be found in both of these Aroclors. Establish the retention time window position using the mid point of the ICAL range before processing the calibration curve.

11.2.2. Calibrate the system immediately prior to conducting any analyses. Refer to Table 3 for instrument conditions. Starting with the standard of lowest concentration, analyze each 1016/1260 calibration standard and tabulate response (peak area) versus the concentration in the standard. Calculate the ratio of the response to the amount injected the (calibration factor) for each analyte at each standard concentration. For 1016/1260 and DCB, the Relative Standard Deviation (RSD) must be less than 20% when average response factor is used.

11.2.3. Analyze each of the single-point calibration standards of the other target Aroclors. Calculate the calibration factor (CF) for each analyte at each standard concentration.

11.2.4. Each calibration of each Aroclor is verified by an independent source. Prepare an independent calibration verification standard (ICV) by dilution of a stock solution purchased from a different vendor and analyze immediately after each initial calibration. Calculate the concentration using the typical procedure used for quantitation. Calculate the percent difference (%D) from the ICV true value. Evaluate the ICV as described in SOC-CAL, *Calibration of Instruments for Organics Chromatographic Analyses.*

11.3. Calibration Verification

11.3.1. The working calibration curve or calibration factor must be verified on each analytical sequence by the analysis of one or more mid-range calibration standards (CCV). A standard (CCV) must be injected at the start of each sequence and after each set of sample extracts (every 10 samples or every 12 hours, whichever is first) in the analysis sequence.

Note: DoD projects require a CCV analysis every 10 field samples.

11.4. Retention Time Windows

11.4.1. Pattern recognition/matching and retention times are used for the identification of PCBs as Aroclors.

11.4.2. Establish retention time windows for the peaks used for quantitation with the GC system in acceptable operating condition. Make three injections of all analytes throughout the course of a 72-hour period. Serial injections over less than a 72-hour period may result in retention time windows that are too tight. Using retention times from these analyses, calculate retention time windows. Refer to EPA Method 8000C for detailed instructions.

11.4.3. Plus or minus three times the standard deviation of the absolute retention times for each standard will be used to define the retention time window; however, the experience of the analyst should weigh heavily in the interpretation of chromatograms. In those cases where the standard deviation for a particular standard is zero, the laboratory may use a default window of $\pm$ 0.03 minutes. If the peak width is $>$ 0.06 minutes, use a default window of 0.1 minutes.

11.4.4. Calculate retention time windows for each standard on each GC column and whenever a new GC column is installed. Retain this data in the method file.

11.5. Gas Chromatography

11.5.1. Set up an analytical sequence for the standards and samples to be analyzed. Calibrate the system as described in Section 11.2. Refer to Table 3 for typical instrument operating conditions. The same conditions must be used for samples as for calibration and QC analyses. Ensure that the instrument configuration is correct and that any necessary maintenance has been performed. Figure 1 shows a typical analysis sequence.

Note: For DoD projects, the CCB must be analyzed following the CCV. Instrument blanks/CCBs may not be analyzed prior to QC samples or standards.

11.5.2. Evaluate the CCVs as indicated in Section 11.3. Use the standards interspersed throughout the sample analysis sequence to evaluate the qualitative performance of the GC system including positioning of the retention time window. If any retention time shift which would impede analyte identification is evident (as shown by Aroclor pattern irregularities or the surrogate falling outside of the retention time window), evaluate the chromatogram for possible causes such as carryover from a highly contaminated sample. If a problem related to GC system has been determined to be the cause of retention time shift, perform whatever maintenance is necessary before reanalyzing the CCV or recalibrating and proceeding with sample analysis. All samples that were injected after the sample exceeded the criteria must be reinjected if initial analysis indicated the presence of any analytes of interest.

FIGURE 1

Analysis Sequence

Initial Calibration Blank	ICB
Standard 1	1221 midpoint
Standard 2	1232 midpoint
Standard 3	1242 midpoint
Standard 4	1248 midpoint
Standard 5	1254 midpoint
Standard 6	1262 midpoint
Standard 7	1268 midpoint
Standards 8-12	1016/1260 ICAL standards
Standards 13-20	ICVs for 1016, 1221, 1232, 1242, 1254, 1260, 1262, 1268
Continuing Calibration Verification	CCV
Method Blank	
Laboratory Control Sample	LCS
Sample 1 - 8	
Matrix Spike	
Duplicate Matrix Spike	
Continuing Calibration Verification	CCV
Continuing Calibration Blank	CCB
Sample 9 - 18	
Continuing Calibration Verification	CCV
Continuing Calibration Blank	CCB

Note: For DoD projects, the CCB must be analyzed following the CCV. Instrument blanks and CCBs may not be analyzed prior to QC samples or standards.

11.6. Troubleshooting

11.6.1. Initial calibration – If the initial calibration fails to meet the criteria, or the ICV fails (indicating a calibration problem), the following steps may be taken, depending on nature of the problem.

- Recheck the information entered into the software used for calibration and quantitation. Verify the standard values are correct and datafiles are correct. If incorrect, repeat the calibration with the correct information.
- Recheck standards preparation to ensure that standards are correct. Re-prepare and reanalyze if needed.
- Ensure that proper preventive maintenance was performed. Repeat the preventive maintenance if necessary and reanalyze the calibration.
- If calibration problems persist or more substantial calibration problems exist, corrective maintenance or repair may be needed. This includes such measures as column changes, detector maintenance, or GC repair. This will depend on the nature of the problem. Following any such maintenance, repeat the calibration.

11.6.2. Continuing calibration – If the CCV analysis fails to meet the criteria, the following steps may be taken, depending on nature of the problem.

- Recheck the information entered into the software used for calibration and quantitation. Verify the standard values are correct and datafiles are correct. If incorrect, repeat the calibration with the correct information.
- Recheck standards preparation to ensure that standards are correct and that the correct standard is used as the CCV. Re-prepare and reanalyze if needed. Note that NELAC and DoD requirements apply when multiple CCVs are analyzed.
- Ensure that proper preventive maintenance was performed. Repeat the preventive maintenance if necessary and reanalyze the CCV.
- If calibration problems persist or more substantial calibration problems exist, corrective maintenance or repair may be needed. This includes such measures as column changes, detector maintenance, or GC repair. This will depend on the nature of the problem. Following any such maintenance, repeat analysis of the CCV and necessary samples. Major maintenance will require recalibration. Note that some samples may quickly deteriorate the system to the point that closing CCVs will not pass. This should be verified through a second run of the samples and documented.

12. QA/QC REQUIREMENTS

12.1. Initial Precision and Recovery Validation

12.1.1. The accuracy and precision of the procedure must be validated before analyses of samples begin, or whenever significant changes to the procedures have been made. To do this, four water samples are spiked with the LCS spike solution, then prepared and analyzed.

12.2. Method Detection Limits and Method Reporting Limits

12.2.1. A method detection limit (MDL) study must be undertaken before analysis of samples can begin. To establish detection limits that are precise and accurate, the analyst must perform the following procedure. Spike seven blank matrix (water or soil) samples with MDL spiking solution at a level below the MRL. Follow the analysis procedures in Section 11 to analyze the samples.

12.2.2. Calculate the average concentration found (x) in µg/mL, and the standard deviation of the concentrations (s) in µg/mL for each analyte. Calculate the MDL for each analyte. Refer to CE-QA011, *Performing Method Detection Limit Studies and Establishing Limits of detection and Quantification.* The MDL study must be verified annually.

12.2.3. Limits of Quantification (LOQ)

12.2.3.1. The laboratory establishes a LOQ for each analyte as the lowest reliable laboratory reporting concentration or in most cases the lowest point in the calibration curve which is less than or equal to the desired regulatory action levels, based on the stated project requirements. Analysis at the lowest point calibration level provides confirmation of the established sensitivity of the method. The LOQ recoveries should be within 50% of the true values to verify the data reporting limit. Refer to CE-QA011, *Performing Method Detection Limit Studies and Establishing Limits of detection and Quantification.*

12.2.4. The Method Reporting Limits (MRLs) used at ALS are the routinely reported lower limits of quantitation which take into account day-to-day fluctuations in instrument sensitivity as well as other factors. These MRLs are the levels to which ALS routinely reports results in order to minimize false positive or false negative results. The MRL is normally two to ten times the method detection limit.

12.3. Ongoing QC Samples required are described in the ALS-Kelso Quality Assurance Manual and in the SOP for Sample Batches. Additional QC Samples may be required in project specific quality assurance plans (QAPP). For example projects managed under the DoD ELAP must follow requirements defined in the DoD *Quality Systems Manual for Environmental Laboratories.* General QA requirements for DoD QSM are defined in the laboratory SOP, Department *of Defense Projects – Laboratory Practices and Project Management (ADM-DOD).* General QC Samples are:

12.3.1. Method blank - A method blank is extracted and analyzed with every batch of 20 or fewer samples to demonstrate that there are no method interferences. The method blank must demonstrate that interferences from the analytical and preparation steps minimized. No target analytes should be detected above the MRL in the method blank.

12.3.1.1. If the method blank fails to meet the criteria, the sample data in the associated batch should be examined. If all samples and QC have hits for the analyte, samples and QC should be re-extracted and reanalyzed as necessary (samples with higher level hits may not need reanalysis). It should be verified through the analysis of instrument blanks that the problem is isolated to either the GC of the sample preparation. If the problem is isolated to the MB, the data may be flagged and narrated. Also refer to the QA Manual for additional corrective action.

12.3.1.2. The source of MB contamination should be isolated and corrected as soon as possible to prevent further failures.

Note: DoD projects require no analytes detected > ½ the RL or > 1/10 the regulatory limit.

12.3.2. A lab control sample (LCS) must be extracted and analyzed with every batch of 20 samples. The water LCS is prepared by adding 50 µL of the matrix spike solution to 1L of reagent water, resulting in a concentration of 2.0 ug/L. The soil LCS is prepared by adding 100 µL of spike solution to 20g of sand, resulting in a concentration of 200 ug/kg. For project-specific low-level extractions, spiking amounts can be adjusted accordingly. Calculate percent recovery (%R) as follows:

%R = X/TV x 100

Where X = Concentration of the analyte recovered
TV = True value of amount spiked

Acceptance criteria for lab control samples are listed in Table 1.

12.3.3. Project-specific or program-specific acceptance criteria may supersede ALS criteria. For example, for samples requiring South Carolina DHEC certification the acceptance criteria are 70-130 % recovery. If the lab control sample (LCS) fails acceptance limits for any of the compounds, the analyst must evaluate the system and calibration. If no problems are found, corrective action must be taken. The acceptance criteria listed are current criteria, but are subject to change as control limits are updated.

12.3.4. A matrix spike/duplicate matrix spike (MS/DMS) must be extracted and analyzed with every batch of 20 or fewer samples. The MS/DMS is prepared by adding the same volume of the matrix spike solution to the sample as listed for the LCS, then proceeding with the entire extraction and analysis. Calculate percent recovery (%R) as follows:

$$\%R = \frac{X - X1}{TV} \times 100$$

Where X = Concentration of the analyte recovered
X1 = Concentration of unspiked analyte
TV = True value of amount spiked

Calculate Relative Percent Difference (RPD) as:

$$RPD = \frac{|R1 - R2|}{(R1 + R2)/2} \times 100$$

Where R1 = % recovery of the MS
R2 = % recovery of the DMS

Acceptance criteria for matrix spikes are listed in Table 1. If the MS/DMS recovery is out of acceptance limits for reasons other than matrix effects, corrective action must be taken. The acceptance criteria listed are current criteria, but are subject to change as control limits are updated.

12.3.5. Surrogate spike is added to every sample, blank and spike prior to extraction. Two surrogate standards (tetrachloro-m-xylene and decachlorobiphenyl) are added to each sample. For water, 100µL of the surrogate spike is added to 1L, resulting in 0.2 ug/L. For soil, 200µL of the surrogate spike is added to 20g, resulting in 20 ug/kg. Calculate surrogate percent recovery (%R) as:

%R = S/V x 100
Where S = The amount of surrogate recovered

V = The amount spiked/final volume

The acceptance limits for the surrogates are given in Table 1. Both surrogate recoveries must be within the acceptance limits. If either (or both) surrogate is outside of acceptance limits for reasons other than matrix interferences, corrective action must be taken. Corrective actions include recalculation, reanalysis, or reextraction and reanalysis. The acceptance criteria listed are current criteria, but are subject to change as control limits are updated.

12.3.6. Control charts should be maintained for QC results. The charts should be reviewed periodically for trends in results. Control limits for QC analyses may be determined using the control charts or similar mechanism on an annual basis.

13. DATA REDUCTION, REVIEW, AND REPORTING

13.1. Identification of PCBs as Aroclors

13.1.1. To identify Aroclors, compare the chromatographic pattern of the sample to known Aroclor standards. Tentative identification of PCBs as Aroclors is made when the pattern of peaks in the sample chromatogram matches the pattern of peaks in the Aroclor standard itself. There also needs to be agreement between the retention times and response ratios of the 3-6 selected quantitation peaks in the sample chromatogram and the Aroclor standard.

13.1.2. Tentative identification of analytes must be confirmed using a second GC column of dissimilar phase. Identify the Aroclor by comparing the chromatographic pattern of the sample to known Aroclor standards analyzed on the same column. Confirmation of the Aroclor is made when the sample chromatogram matches the pattern of peaks in the Aroclor being confirmed. Quantitations for the 2 columns must agree (≤ 40%RPD) to confirm the identification. If interferences or other sample anomalies make the RPD value >40% but the analyst makes a positive identification, the basis of the identification must be documented and the data user notified of the discrepancy (see section 13.2).

13.2. Sample matrix difficulties

13.2.1. Weathering of PCBs in the environment and changes resulting from waste treatment processes may alter the pattern of a specific Aroclor so it does not closely match an Aroclor standard. The earlier eluting peaks will often diminish in comparison to the later eluting peaks. If this is observed, alternate peaks may be selected to aid identification to reduce quantitation bias.

13.2.2. Metabolism by organisms may also alter the pattern since individual PCB congeners are metabolized at different rates. When working with tissue samples, the 40% RPD criteria for confirmation may not be met.

13.2.3. Samples may also include mixtures of two or more Aroclors. To the extent possible, identify and quantify each Aroclor.

13.2.4. High amounts of organochlorine pesticides in the sample may interfere with identification. If this is observed, alternate peaks may be selected to aid identification to reduce quantitation bias. Certain fractionization cleanups can be used to selectively remove organochlorine pesticides, aiding in Aroclor determination (Acid cleanup, SOC-3665).

13.2.5. For all of these reasons a high level of analyst expertise is required to interpret complex chromatograms.

13.3. Quantitation of PCBs as Aroclors:

13.3.1. The quantitation of PCBs as Aroclors is accomplished by comparison of the sample chromatogram to that of the most similar Aroclor standard or standards. All calibration acceptance criteria as described in section 11 must be met before reporting any results. Sample results should then be reported according to the organics confirmation SOP (SOC-CONF). Results may be reported from either column if all calibration acceptance criteria as described in section 11are met.

13.3.2. Once the Aroclor pattern has been identified, compare the responses of 3 to 6 major peaks in the calibration standard of that Aroclor with the peaks observed in the sample extract. The amount of Aroclor is calculated using the individual calibration factor for each of the 3 to 6 peaks and the calibration model selected in section 11. The concentration is determined using the 3 to 6 characteristic peaks and then the concentrations are averaged to determine the concentration of the Aroclor. If there are interfering peaks with the 3 to 6 quantitation peaks that cause Aroclor average to be falsely overstated, then that interference peak is Q-deleted using the data system and the average is recalculated so that the average more truly represents the concentration in the sample. This often occurs when there are more than one Aroclor in a sample extract or if pesticides are present. Quantitation of mixed Aroclors will require the selection of peaks that are not shared in common by both Aroclors.

13.3.3. For samples with severe matrix interferences, the quantitation may be performed by measuring the total area of the PCB pattern and quantifying on the basis of the Aroclor standard that is most similar to the sample. Any peaks that are not identifiable as PCBs should be subtracted from the total area. When the quantitation option is used, the sample problems should be described for the data user and quantification procedure documented.

13.3.4. Using the data system, calculate the concentration in the extract using the calibration model chosen for calibration (see SOC-CAL).

13.3.5. Using the data system, calculate the concentration of each analyte in the sample extract (Cex) µg/ml units using the calibration factor or calibration curve (Section 11). The sample concentration computed using the following equations:

Aqueous Samples:

$$Concentration\ (\mu g / L) = \frac{(Cex)\ (Vf)\ (D)}{(Vs)}$$

Where	Cex	=	Concentration in extract in µg/ml
	Vf	=	Final volume of extract in ml
	D	=	Dilution factor
	Vs	=	Volume of sample extracted, liters

Nonaqueous Samples:

$$Concentration\ (mg / Kg) = \frac{(Cex)\ (Vf)\ (D)\ x\ 1{,}000}{(W)\ x\ 1{,}000}$$

Where Cex = Concentration in extract in µg/ml
Vf = Final volume of extract in ml
D = Dilution factor
W = Weight of sample extracted. The wet or dry weight may be used, depending upon the specific client requirements.

13.4. Sample concentrations are reported when all QC criteria for the analysis have been met or the results are qualified with a footnote.

13.5. Data Review

13.5.1. Following primary data interpretation and calculations, all data is reviewed by a secondary analyst. Following generation of the report, the report is also reviewed. Refer ADM-DREV, *Laboratory Data Review Process* for details. The person responsible for final review of the data report and/or data package should assess the overall validity and quality of the results and provide any appropriate comments and information to the Project Chemist to inclusion in the report narrative.

13.6. Reporting

13.6.1. Reports are generated using the STEALTH Data Reporting System which compiles the SMO login information. This compilation is then transferred to a file, which STEALTH uses to generate a report. The forms generated may be ALS standard reports, DOD, or client-specific reports. The compiled data from LIMS is also used to create EDDs.

13.6.2. As an alternative, reports are generated using Excel© templates located in R:\SVG\forms. The analyst should choose the appropriate form and QC pages to correspond to required tier level and deliverables requirements. The detected analytes, surrogate and matrix spikes are then transferred, by hand or electronically, to the templates.

13.6.3. Sample concentrations are reported when all QC criteria for the analysis have been met or the results are qualified with an appropriate footnote. For Arizona projects the appropriate Arizona qualifier must be used.

14. CONTINGENCIES FOR HANDLING OUT-OF-CONTROL OR UNACCEPTABLE DATA

14.1. Refer to the SOP for *Non Conformance and Corrective Action (CE-QA008)* for procedures for corrective action. Personnel at all levels and positions in the laboratory are to be alert to identifying problems and nonconformities when errors, deficiencies, or out-of-control situations are detected.

14.2. Handling out-of-control or unacceptable data

14.2.1. On-the-spot corrective actions that are routinely made by analysts and result in acceptable analyses should be documented as normal operating procedures, and no specific documentation need be made other than notations in laboratory maintenance logbooks, runlogs, for example.

14.2.2. Some examples when documentation of a nonconformity is required using a Nonconformity and Corrective Action Report (NCAR):

- Quality control results outside acceptance limits for accuracy and precision
- Method blanks or continuing calibration blanks (CCBs) with target analytes above acceptable levels
- Sample holding time missed due to laboratory error or operations
- Deviations from SOPs or project requirements
- Laboratory analysis errors impacting sample or QC results
- Miscellaneous laboratory errors (spilled sample, incorrect spiking, etc)
- Sample preservation or handling discrepancies due to laboratory or operations error

15. METHOD PERFORMANCE

15.1. This method was validated through single laboratory studies of accuracy and precision. Refer to the reference method for additional method performance data available.

15.2. The method detection limit (MDL) is established using the procedure described in CE-QA011, *Performing Method Detection Limit Studies and Establishing Limits of detection and Quantification*. Method Reporting Limits are established for this method based on MDL studies and as specified in the ALS Quality Assurance Manual.

16. TRAINING

16.1. Training outline

16.1.1. Review literature (see references section). Read and understand the SOP. Also review the applicable MSDS for all reagents and standards used. Following these reviews, observe the procedure as performed by an experienced analyst at least three times.

16.1.2. The next training step is to assist in the procedure under the guidance of an experienced analyst for a period of 3 months. During this period, the analyst is expected to transition from a role of assisting, to performing the procedure with minimal oversight from an experienced analyst.

16.1.3. Perform initial precision and recovery (IPR) study as described above for water samples. Summaries of the IPR are reviewed and signed by the supervisor. Copies may be forwarded to the employee's training file. For applicable tests, IPR studies should be performed in order to be equivalent to NELAC's Initial Demonstration of Capability.

16.2. Training is documented following the SOP for Documentation of Technical Personnel Training.

16.2.1. NOTE: When the analyst training is documented by the supervisor on internal training documentation forms, the supervisor is acknowledging that the analyst has read and understands this SOP and that adequate training has been given to the analyst to competently perform the analysis independently.

17. POLLUTION PREVENTION AND WASTE MANAGEMENT

17.1. It is the laboratory's practice to minimize the amount of solvents, acids, and reagents used to perform this method wherever feasibly possible. Standards are prepared in volumes consistent with methodology and only the amount needed for routine laboratory use is kept on site. The threat to the environment from solvents and/or reagents used in this method can be minimized when recycled or disposed of properly.

17.2. The laboratory will comply with all Federal, State, and local regulations governing waste management, particularly the hazardous waste identification rules and land disposal restrictions as specified in the ALS Environmental Health and Safety Manual.

18. METHOD MODIFICATIONS

18.1. There are no known modifications in this laboratory standard operating procedure from the reference method.

19. REFERENCES

18.1. Polychlorinated Biphenyls (PCBs) as Aroclors, Method 8082A, Revision 1, February 2007, EPA Test Methods for Evaluating Solid Waste, SW-846, Update IV

18.2. Determinative Chromatographic Separations, EPA SW846, Test Methods For Evaluating Solid Waste, On-Line, Method 8000C, Revision 3, March 2003.

18.3. 8000C Method criteria, Arizona DHS, 2/13/2007. Available online at http://www.azdhs.gov/lab/license/tech/8000cmethod.pdf

18.4. *DoD Quality Systems Manual for Environmental Laboratories* Version 4.2 10/25/10.

20. CHANGES SINCE THE LAST REVISION

20.1. Reformatted to ALS branding.
20.2. Replaced “CAS” references with “ALS”.
20.3. Updated SOP references.
20.4. Sec. 7.1: removed reference to GC09.
20.5. Sec. 11.2.1: Added clarification for choosing peaks.
20.6. Updated limits in Table 1.
20.7. Added Table 2.
20.8. Made extensive updates to Table 3.

TABLE 1

TARGET COMPOUNDS, MRLs, and MDLs

Analyte	Method Detection Limit		Method Reporting Limit	
	Water ug/L	Soil mg/kg	Water ug/L	Soil mg/kg
Aroclor 1016	0.0021	0.0085	0.005	0.1
Aroclor 1221	0.0021	0.0085	0.01	0.2
Aroclor 1232	0.0021	0.0085	0.005	0.1
Aroclor 1242	0.0021	0.0085	0.005	0.1
Aroclor 1248	0.0021	0.0085	0.005	0.1
Aroclor 1254	0.0021	0.0085	0.005	0.1
Aroclor 1260	0.0021	0.0085	0.005	0.1
Aroclor 1262	0.0021	0.0085	0.005	0.1
Aroclor 1268	0.0021	0.0085	0.005	0.1

TABLE 2

Summary of Corrective Actions				
Method Reference	**Control**	**Specification and Frequency**	**Acceptance Criteria**	**Corrective Action**
EPA 8082A	ICAL	Prior to sample analysis	% RSD ≤ 20 R2 ≥ 0.995 COD ≥ 0.990	Correct problem then repeat ICAL
EPA 8082A	ICV	After ICAL	± 20% Diff	Correct problem and verify second source standard; rerun second source verification. If fails, correct problem and repeat initial calibration.
EPA 8082A	CCV	Prior to sample analysis, every 10 samplesor 12 hours	± 20% Diff	Correct problem then repeat CCV or repeat ICAL
EPA 8082A	Method Blank	Include with each analysis batch (up to 20 samples)	<MRL	If target exceeds MRL, reanalyze to determine if instrument was cause. If still noncompliant then: Re-extract or reanalyze samples containing contaminate, unless samples contain > 20x amount in blank.
EPA 8082A	Laboratory Control Sample	Include with each analysis batch (up to 20 samples)	Refer to DQO Tables	If exceeds limits, re-extract and re-analyze
EPA 8082A	Matrix Spike	Include with each analysis batch (up to 20 samples)	Refer to DQO Tables	Evaluate data to determine if the there is a matrix effect or analytical error
EPA 8082A	Sample Duplicates	Include with each analysis batch (up to 20 samples)	W, RPD ≤ 30 S, RPD ≤ 40	Re-homogenize and re-analyze if result is > 5 X the MRL

TABLE 3

Gas Chromatograph Operating Conditions*

Gas Chromatograph:	Hewlett-Packard Model 6890 or equivalent w/ECD
Injection Port Temperature:	Initial Temp 90°C for 0.5 min., 250°C/min ramp to 325°C for 5.0 min., 20°C/min ramp to 250°C for 5.0 min.
Oven Temperature Program:	90°C for 0.5 min., 5ºC/min ramp to 230°C for 0.5 min., then 7ºC/min. to 315°C, hold 0.06 min.
Detector Temperature:	325°C
Injection Volume:	1 µL
Column:	30 m, DB-35MS and 30 m DB-XLB*
Carrier Gas:	Hydrogen
Auxillary Gas:	Nitrogen
Data System:	HP Chemstation (acquisition) and Target (data)

* The instrument temperatures may be modified depending on the instrument used. Also, the GC column diameter and film thickness depend on the instrument used. All conditions must be the same for initial calibration, continuing calibration, sample, and QC analyses.

TABLE 4

CALIBRATION STANDARD PREPARATION

1016/1260 Initial Calibration Standards (prepared in hexane)

Aroclor 1016 50 ug/mL Intermediate	Aroclor 1260 50 ug/mL Intermediate	Surrogate 5 ug/mL Intermediate	Final Volume	Final Concentration Aroclors	Final Concentration Surrogates
12.5 uL	12.5 uL	12.5 uL	25 mL	25 ug/L	2.5 ug/L
25 uL	25 uL	25 uL	25 mL	50 ug/L	5.0 ug/L
250 uL	250 uL	250 uL	25 mL	500 ug/L	50 ug/L
500 uL	500 uL	500 uL	25 mL	1000 ug/L*	100 ug/L*
1000 uL	1000 uL	1000 uL	25 mL	2000 ug/L	200 ug/L
2500 uL	2500 uL	2500 uL	25 mL	5000 ug/L	500 ug/L

* CCV Standard

Single-Point Calibration Standards

Intermediate Standard (1000 ug/mL)	Aliquot	Final Volume	Solvent	Final Concentration
Aroclor 1221	25 uL	25 mL	Hexane	1000 ug/L
Aroclor 1232	25 uL	25 mL		1000 ug/L
Aroclor 1242	25 uL	25 mL		1000 ug/L
Aroclor 1248	25 uL	25 mL		1000 ug/L
Aroclor 1254	25 uL	25 mL		1000 ug/L
Aroclor 1262	25 uL	25 mL		1000 ug/L
Aroclor 1268	25 uL	25 mL		1000 ug/L

ICV Standards

ICV Stock Standard (100 ug/mL)	Aliquot	Final Volume	Solvent	Final Concentration
Aroclor 1016	250 uL	25 mL	Hexane	1000 ug/L
Aroclor 1221	250 uL	25 mL		1000 ug/L
Aroclor 1232	250 uL	25 mL		1000 ug/L
Aroclor 1242	250 uL	25 mL		1000 ug/L
Aroclor 1248	250 uL	25 mL		1000 ug/L
Aroclor 1254	250 uL	25 mL		1000 ug/L
Aroclor 1260	250 uL	25 mL		1000 ug/L
Aroclor 1262	250 uL	25 mL		1000 ug/L
Aroclor 1268	250 uL	25 mL		1000 ug/L

METHOD	DEFAULT PREP METHOD	ANALYTE	CAS No.	MATRIX	MDLa	MRL	UNITS	Accuracy (LCS %Rec)	Matrix Spike (%Rec.)	Precision (% RPD)	DOD LODb	DOD LOQc	UNITS	DOD QSM (LCS %Rec)	DOD QSM (Matrix Spike %Rec)	DOD QSM (%RPD)	DoD Cert	LIMS Code	Holding time	Container	Preservative	Minimum Volume
8082A	3541	Aroclor 1016	12674-11-2	Soil	0.0085	0.10	mg/kg	42-122	23-145	40	0.038	0.10	mg/kg	40-140	30	40	Y		NA	8oz jar	4C	20g
8082A	3541	Aroclor 1221	11104-28-2	Soil	0.0085	0.20	mg/kg	-	-	-	0.038	0.20	mg/kg		30	-	Y		NA	8oz jar	4C	20g
8082A	3541	Aroclor 1232	11141-16-5	Soil	0.0085	0.10	mg/kg	-	-	-	0.038	0.10	mg/kg		30	-	Y		NA	8oz jar	4C	20g
8082A	3541	Aroclor 1242	53469-21-9	Soil	0.0085	0.10	mg/kg	-	-	-	0.038	0.10	mg/kg		30	-	Y		NA	8oz jar	4C	20g
8082A	3541	Aroclor 1248	12672-29-6	Soil	0.0085	0.10	mg/kg	-	-	-	0.038	0.10	mg/kg		30	-	Y		NA	8oz jar	4C	20g
8082A	3541	Aroclor 1254	11097-69-1	Soil	0.0085	0.10	mg/kg	-	-	-	0.038	0.10	mg/kg		30	-	Y		NA	8oz jar	4C	20g
8082A	3541	Aroclor 1260	11096-82-5	Soil	0.0085	0.10	mg/kg	50-124	24-148	40	0.038	0.10	mg/kg	60-130	30	40	Y		NA	8oz jar	4C	20g
8082A	3541	Aroclor 1262	37324-23-5	Soil	0.0085	0.10	mg/kg	-	-	-	0.038	0.10	mg/kg		30	-	Y		NA	8oz jar	4C	20g
8082A	3541	Aroclor 1268	11100-14-4	Soil	0.0085	0.10	mg/kg	-	-	-	0.038	0.10	mg/kg		30	-	Y		NA	8oz jar	4C	20g
8082A	3541	Decachlorobiphenyl (S	2051-24-3	Soil				43-148											NA	8oz jar	4C	20g
8082A		Aroclor 5432	63496-31-1	Soil	2.1	20	ug/Kg	70-130	70-130	40	6.3	20	ug/Kg			40			NA	8oz jar	4C	20g
8082A		Aroclor 5442	12642-23-8	Soil	2.1	20	ug/Kg	70-130	70-130	40	6.3	20	ug/Kg			40			NA	8oz jar	4C	20g
8082A		Aroclor 5460	11126-42-4	Soil	2.1	100	ug/Kg	70-130	70-130	40	6.3	100	ug/Kg			40			NA	8oz jar	4C	20g
8082A		Decachlorobiphenyl (S	2051-24-3	Soil	NA	NA	%	50-123	NA	NA	NA	NA	%	60-125	30	NA	NA		NA	8oz jar	4C	20g
8082A		Tetrachloro-m-xylene	877-09-8	Soil	NA	NA	%	30-125	NA	NA	NA	NA	%		30	NA	NA		NA	8oz jar	4C	20g
8082A	3535	Aroclor 1232	11141-16-5	Water	0.049	0.2	ug/L	-	-	-	0.1	0.2	ug/L		30	-	Y		7/40 days	er amber g	4C	1 liter
8082A	3535	Aroclor 1242	53469-21-9	Water	0.049	0.2	ug/L	-	-	-	0.1	0.2	ug/L		30	-	Y		7/40 days	er amber g	4C	1 liter
8082A	3535	Aroclor 1248	12672-29-6	Water	0.049	0.2	ug/L	-	-	-	0.1	0.2	ug/L		30	-	Y		7/40 days	er amber g	4C	1 liter
8082A	3535	Aroclor 1254	11097-69-1	Water	0.049	0.2	ug/L	-	-	-	0.1	0.2	ug/L		30	-	Y		7/40 days	er amber g	4C	1 liter
8082A	3535	Aroclor 1260	11096-82-5	Water	0.049	0.2	ug/L	60-103	39-128	30	0.1	0.2	ug/L	30-145	30	30	Y		7/40 days	er amber g	4C	1 liter
8082A	3535	Aroclor 1262	37324-23-5	Water	0.049	0.2	ug/L	-	-	-	0.1	0.2	ug/L		30	-	Y		7/40 days	er amber g	4C	1 liter
8082A	3535	Aroclor 1268	11100-14-4	Water	0.049	0.2	ug/L	-	-	-	0.1	0.2	ug/L		30	-	Y		7/40 days	er amber g	4C	1 liter
8082A	3535	Decachlorobiphenyl (S	2051-24-3	Water	NA	NA	%	39-140	NA	NA	NA	NA	%	40-135	30	NA	NA		7/40 days	er amber g	4C	1 liter
8082A	3535	Tetrachloro-m-xylene	877-09-8	Water	NA	NA	%	37-121	NA	NA	NA	NA	%		30	NA	NA		7/40 days	er amber g	4C	1 liter
8082A	3535A	Aroclor 1016	12674-11-2	Water-UL	0.0021	0.005	ug/L	50-103	25-144	30	0.005	0.005	ug/L	25-145	30	30	Y		7/40 days	er amber g	4C	1 liter
8082A	3535A	Aroclor 1221	11104-28-2	Water-UL	0.0021	0.01	ug/L	-	-	-	0.005	0.01	ug/L			-	Y		7/40 days	er amber g	4C	1 liter
8082A	3535A	Aroclor 1232	11141-16-5	Water-UL	0.0021	0.005	ug/L	-	-	-	0.005	0.005	ug/L			-	Y		7/40 days	er amber g	4C	1 liter
8082A	3535A	Aroclor 1242	53469-21-9	Water-UL	0.0021	0.005	ug/L	-	-	-	0.005	0.005	ug/L			-	Y		7/40 days	er amber g	4C	1 liter
8082A	3535A	Aroclor 1248	12672-29-6	Water-UL	0.0021	0.005	ug/L	-	-	-	0.005	0.005	ug/L			-	Y		7/40 days	er amber g	4C	1 liter
8082A	3535A	Aroclor 1254	11097-69-1	Water-UL	0.0021	0.005	ug/L	-	-	-	0.005	0.005	ug/L			-	Y		7/40 days	er amber g	4C	1 liter
8082A	3535A	Aroclor 1260	11096-82-5	Water-UL	0.0021	0.005	ug/L	56-100	40-127	30	0.005	0.005	ug/L	30-145	30	30	Y		7/40 days	er amber g	4C	1 liter
8082A	3535A	Aroclor 1262	37324-23-5	Water-UL	0.0021	0.005	ug/L	-	-	-	0.005	0.005	ug/L			-	Y		7/40 days	er amber g	4C	1 liter
8082A	3535A	Aroclor 1268	11100-14-4	Water-UL	0.0021	0.005	ug/L	-	-	-	0.005	0.005	ug/L			-	Y		7/40 days	er amber g	4C	1 liter
8082A	3535A	Decachlorobiphenyl (S	2051-24-3	Water-UL	NA	NA	%				NA	NA	%						7/40 days	er amber g	4C	1 liter
8082A	3535A	Tetrachloro-m-xylene	877-09-8	Water-UL	NA	NA	%				NA	NA	%						7/40 days	er amber g	4C	1 liter
8082A	3550B	Aroclor 1016	12674-11-2	Soil	0.0061	0.1	mg/kg	37-121	27-128	40	0.0125	0.05	mg/kg	40-140	30	40	Y		NA	8oz jar	4C	20g
8082A	3550B	Aroclor 1221	11104-28-2	Soil	0.0061	0.2	mg/kg				0.0125	0.05	mg/kg		30		Y		NA	8oz jar	4C	20g
8082A	3550B	Aroclor 1232	11141-16-5	Soil	0.0061	0.1	mg/kg				0.0125	0.05	mg/kg		30		Y		NA	8oz jar	4C	20g
8082A	3550B	Aroclor 1242	53469-21-9	Soil	0.0061	0.1	mg/kg				0.0125	0.05	mg/kg		30		Y		NA	8oz jar	4C	20g
8082A	3550B	Aroclor 1248	12672-29-6	Soil	0.0061	0.1	mg/kg				0.0125	0.05	mg/kg		30		Y		NA	8oz jar	4C	20g
8082A	3550B	Aroclor 1254	11097-69-1	Soil	0.0061	0.1	mg/kg				0.0125	0.05	mg/kg		30		Y		NA	8oz jar	4C	20g
8082A	3550B	Aroclor 1260	11096-82-5	Soil	0.0061	0.1	mg/kg	42-123	29-131	40	0.0125	0.05	mg/kg	60-130	30	40	Y		NA	8oz jar	4C	20g
8082A	3550B	Aroclor 1262	37324-23-5	Soil	0.0061	0.1	mg/kg				0.0125	0.05	mg/kg		30		Y		NA	8oz jar	4C	20g
8082A	3550B	Aroclor 1268	11100-14-4	Soil	0.0061	0.1	mg/kg				0.0125	0.05	mg/kg		30		Y		NA	8oz jar	4C	20g
8082A	3550B	Decachlorobiphenyl (S	2051-24-3	Soil	NA	NA	%	50-123	NA	NA	NA	NA	%	60-125	30	NA	NA		NA	8oz jar	4C	20g
8082A	3550B	Tetrachloro-m-xylene	877-09-8	Soil	NA	NA	%	30-125	NA	NA	NA	NA	%		30	NA	NA		NA	8oz jar	4C	20g
8082A Cong		PCB1 (2-Chlorobipher	2051-60-7	Soil	1.2	5.0	ug/kg	70-130	70-130	40	2.5	5	ug/kg			40	N					
8082A Cong		PCB101 (2,2',4,5,5'-P	37680-73-2	Soil	0.078	0.50	ug/kg	70-130	70-130	40	0.175	0.5	ug/kg			40	Y					
8082A Cong		PCB105 (2,3,3',4,4'-P	32598-14-4	Soil	0.053	0.50	ug/kg	49-116	39-115	40	0.1	0.5	ug/kg			40	Y					
8082A Cong		PCB110 (2,3,3',4',6-P	38380-03-9	Soil	0.082	0.50	ug/kg	70-130	70-130	40	0.088	0.5	ug/kg			40	Y					
8082A Cong		PCB114 (2,3,4,4',5-Pe	74472-37-0	Soil	0.068	0.50	ug/kg	52-111	36-113	40	0.088	0.5	ug/kg			40	Y					
8082A Cong		PCB118 (2,3',4,4',5-P	31508-00-6	Soil	0.078	0.50	ug/kg	45-117	30-120	40	0.1	0.5	ug/kg			40	Y					
8082A Cong		PCB119 (2,3',4,4',6-P	56558-17-9	Soil	0.072	0.50	ug/kg	70-130	70-130	40	0.1	0.5	ug/kg			40	Y					
8082A Cong		PCB123 (2',3,4,4',5-P	65510-44-3	Soil	0.092	0.50	ug/kg	56-119	49-114	40	0.175	0.5	ug/kg			40	Y					
8082A Cong		PCB126 (3,3',4,4',5-P	57465-28-8	Soil	0.072	0.50	ug/kg	49-129	39-126	40	0.1	0.5	ug/kg			40	Y					
8082A Cong		PCB128 (2,2',3,3',4,4'	38380-07-3	Soil	0.08	0.50	ug/kg	41-117	36-109	40	0.1	0.5	ug/kg			40	Y					
8082A Cong		PCB132 (2,2',3,3',4,6'	38380-05-1	Soil	0.072	0.50	ug/kg	70-130	70-130	40	0.175	0.5	ug/kg			40	Y					
8082A Cong		PCB138 (2,2',3,4,4',5'	35065-28-2	Soil	0.075	0.50	ug/kg	53-113	32-119	40	0.175	0.5	ug/kg			40	Y					
8082A Cong		PCB141 (2,2',3,4,5,5'-	52712-04-6	Soil	0.059	0.50	ug/kg	70-130	70-130	40	0.088	0.5	ug/kg			40	Y					
8082A Cong		PCB149 (2,2',3,4',5',6	38380-04-0	Soil	0.07	0.50	ug/kg	70-130	70-130	40	0.263	0.5	ug/kg			40	Y					

METHOD	DEFAULT PREP METHOD	ANALYTE	CAS No.	MATRIX	MDLa	MRL	UNITS	Accuracy (LCS %Rec)	Matrix Spike (%Rec.)	Precision (% RPD)	DOD LODb	DOD LOQc	UNITS	DOD QSM (LCS %Rec)	DOD QSM (Matrix Spike %Rec)	DOD QSM (%RPD)	DoD Cert	LIMS Code	Holding time	Container	Preservative	Minimum Volume
8082A Cong		PCB151 (2,2',3,5,5',6-	52663-63-5	Soil	0.069	0.50	ug/kg	70-130	70-130	40	0.088	0.5	ug/kg			40	Y					
8082A Cong		PCB153 (2,2',4,4',5,5'-	35065-27-1	Soil	0.097	0.50	ug/kg	41-115	28-121	40	0.1	0.5	ug/kg			40	Y					
8082A Cong		PCB156 (2,3,3',4,4',5-	38380-08-4	Soil	0.073	0.50	ug/kg	48-124	39-120	40	0.088	0.5	ug/kg			40	Y					
8082A Cong		PCB157 (2,3,3',4,4',5'-	69782-90-7	Soil	0.076	0.50	ug/kg	48-117	45-105	40	0.1	0.5	ug/kg			40	Y					
8082A Cong		PCB158 (2,3,3',4,4',6-	74472-42-7	Soil	0.07	0.50	ug/kg	48-122	40-119	40	0.1	0.5	ug/kg			40	Y					
8082A Cong		PCB166 (2,3,4,4',5,6-I	41411-63-6	Soil	0.061	0.50	ug/kg	70-130	70-130	40	0.1	0.5	ug/kg			40	Y					
8082A Cong		PCB167 (2,3',4,4',5,5'-	52663-72-6	Soil	0.088	0.50	ug/kg	52-124	45-116	40	0.175	0.5	ug/kg			40	Y					
8082A Cong		PCB168 (2,3',4,4',5',6-	59291-65-5	Soil	0.069	0.50	ug/kg	70-130	70-130	40	0.1	0.5	ug/kg			40	Y					
8082A Cong		PCB169 (3,3',4,4',5,5'-	32774-16-6	Soil	0.093	0.50	ug/kg	41-120	36-112	40	0.1	0.5	ug/kg			40	Y					
8082A Cong		PCB170 (2,2',3,3',4,4',	35065-30-6	Soil	0.066	0.50	ug/kg	40-122	33-117	40	0.1	0.5	ug/kg			40	Y					
8082A Cong		PCB174 (2,2',3,3',4,5,	38411-25-5	Soil	0.08	0.50	ug/kg	70-130	70-130	40	0.1	0.5	ug/kg			40	Y					
8082A Cong		PCB177 (2,2',3,3',4',5,	52663-70-4	Soil	0.089	0.50	ug/kg	70-130	70-130	40	0.175	0.5	ug/kg			40	Y					
8082A Cong		PCB18 (2,2',5-Trichlor	37680-65-2	Soil	0.086	0.50	ug/kg	47-116	38-120	40	0.175	0.5	ug/kg			40	Y					
8082A Cong		PCB180 (2,2',3,4,4',5,	35065-29-3	Soil	0.083	0.50	ug/kg	49-130	28-137	40	0.175	0.5	ug/kg			40	Y					
8082A Cong		PCB183 (2,2',3,4,4',5',	52663-69-1	Soil	0.064	0.50	ug/kg	52-113	34-119	40	0.175	0.5	ug/kg			40	Y					
8082A Cong		PCB184 (2,2',3,4,4',6,	74472-48-3	Soil	0.078	0.50	ug/kg	54-122	40-120	40	0.175	0.5	ug/kg			40	Y					
8082A Cong		PCB187 (2,2',3,4',5,5',	52663-68-0	Soil	0.087	0.50	ug/kg	49-140	43-127	40	0.175	0.5	ug/kg			40	Y					
8082A Cong		PCB189 (2,3,3',4,4',5,	39635-31-9	Soil	0.068	0.50	ug/kg	43-128	42-113	40	0.088	0.5	ug/kg			40	Y					
8082A Cong		PCB194 (2,2',3,3',4,4',	35694-08-7	Soil	0.082	0.50	ug/kg	70-130	70-130	40	0.088	0.5	ug/kg			40	Y					
8082A Cong		PCB195 (2,2',3,3',4,4',	52663-78-2	Soil	0.085	0.50	ug/kg	41-130	29-128	40	0.088	0.5	ug/kg			40	Y					
8082A Cong		PCB201 (2,2',3,3',4,5',	40186-71-8	Soil	0.13	0.50	ug/kg	70-130	70-130	40	0.088	0.5	ug/kg			40	Y					
8082A Cong		PCB203 (2,2',3,4,4',5,	52663-76-0	Soil	0.077	0.50	ug/kg	70-130	70-130	40	0.088	0.5	ug/kg			40	Y					
8082A Cong		PCB206 (2,2',3,3',4,4',	40186-72-9	Soil	0.078	0.50	ug/kg	46-115	27-119	40	0.088	0.5	ug/kg			40	Y					
8082A Cong		PCB209 (Decachlorob	2051-24-3	Soil	0.085	0.50	ug/kg	49-136	35-130	40	0.088	0.5	ug/kg			40	Y					
8082A Cong		PCB28 (2,4,4'-Trichlor	7012-37-5	Soil	0.064	0.50	ug/kg	59-128	48-131	40	0.175	0.5	ug/kg			40	Y					
8082A Cong		PCB31 (2,4',5-Trichlor	16606-02-3	Soil	0.069	0.50	ug/kg	70-130	70-130	40	0.1	0.5	ug/kg			40	Y					
8082A Cong		PCB33 (2',3,4-Trichlor	38444-86-9	Soil	0.097	0.50	ug/kg	70-130	70-130	40	0.425	0.5	ug/kg			40	Y					
8082A Cong		PCB37 (3,4,4'-Trichlor	38444-90-5	Soil	0.12	0.50	ug/kg	70-130	70-130	40	0.1	0.5	ug/kg			40	Y					
8082A Cong		PCB44 (2,2',3,5'-Tetra	41464-39-5	Soil	0.25	0.50	ug/kg	53-121	42-122	40	0.175	0.5	ug/kg			40	Y					
8082A Cong		PCB49 (2,2',4,5'-Tetra	41464-40-8	Soil	0.095	0.50	ug/kg	70-130	70-130	40	0.1	0.5	ug/kg			40	Y					
8082A Cong		PCB5 (2,3-Dichlorobip	16605-91-7	Soil	0.2	0.50	ug/kg	70-130	70-130	40	0.263	0.5	ug/kg			40	Y					
8082A Cong		PCB52 (2,2',5,5'-Tetra	35693-99-3	Soil	0.15	0.50	ug/kg	50-115	40-118	40	0.175	0.5	ug/kg			40	Y					
8082A Cong		PCB56 (2,3,3',4'-Tetra	41464-43-1	Soil	0.12	0.50	ug/kg	70-130	70-130	40	0.175	0.5	ug/kg			40	Y					
8082A Cong		PCB60 (2,3,4,4'-Tetra	33025-41-1	Soil	0.069	0.50	ug/kg	38-127	14-152	40	0.1	0.5	ug/kg			40	Y					
8082A Cong		PCB66 (2,3',4,4'-Tetra	32598-10-0	Soil	0.1	0.50	ug/kg	58-130	48-132	40	0.088	0.5	ug/kg			40	Y					
8082A Cong		PCB70 (2,3',4',5-Tetra	32598-11-1	Soil	0.15	0.50	ug/kg	70-130	70-130	40	0.175	0.5	ug/kg			40	Y					
8082A Cong		PCB74 (2,4,4',5-Tetra	32690-93-0	Soil	0.1	0.50	ug/kg	70-130	70-130	40	0.175	0.5	ug/kg			40	Y					
8082A Cong		PCB77 (3,3',4,4'-Tetra	32598-13-3	Soil	0.082	0.50	ug/kg	42-111	31-114	40	0.1	0.5	ug/kg			40	Y					
8082A Cong		PCB8 (2,4'-Dichlorobiphenyl)		Soil	0.14	0.50	ug/kg	54-135	47-133	40	0.425	0.5	ug/kg			40	Y					
8082A Cong		PCB81 (3,4,4',5-Tetra	70362-50-4	Soil	0.07	0.50	ug/kg	34-136	20-133	40	0.1	0.5	ug/kg			40	Y					
8082A Cong		PCB87 (2,2',3,4,5'-Pe	38380-02-8	Soil	0.15	0.50	ug/kg	53-118	35-126	40	0.088	0.5	ug/kg			40	Y					
8082A Cong		PCB90 (2,2',3,4',5-Pe	68194-07-0	Soil	0.094	0.50	ug/kg	24-147	24-147	40	0.1	0.5	ug/kg			40	Y					
8082A Cong		PCB95 (2,2',3,5',6-Pe	38379-99-6	Soil	0.049	0.50	ug/kg	70-130	70-130	40	0.1	0.5	ug/kg			40	Y					
8082A Cong		PCB97 (2,2',3',4,5-Pe	41464-51-1	Soil	0.09	0.50	ug/kg	70-130	70-130	40	0.175	0.5	ug/kg			40	Y					
8082A Cong		PCB99 (2,2',4,4',5-Pe	38380-01-7	Soil	0.079	0.50	ug/kg	70-130	70-130	40	0.175	0.5	ug/kg			40	Y					
8082A Cong		Tetrachloro-m-xylene	877-09-8	Soil	NA	NA	%	10-135	NA	NA	NA	NA	%			NA	NA					
8082A Cong		PCB1 (2-Chlorobipher	2051-60-7	Water	1.1	5	ng/L	70-130	70-130	30	10	50	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB101 (2,2',4,5,5'-Pe	37680-73-2	Water	0.23	5	ng/L	70-130	70-130	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB105 (2,3,3',4,4'-Pe	32598-14-4	Water	0.35	5	ng/L	46-120	46-120	30	1	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB110 (2,3,3',4',6-Pe	38380-03-9	Water	0.19	5	ng/L	70-130	70-130	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB114 (2,3,4,4',5-Pe	74472-37-0	Water	0.23	5	ng/L	51-116	51-116	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB118 (2,3',4,4',5-Pe	31508-00-6	Water	0.32	5	ng/L	42-118	42-118	30	0.25	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB119 (2,3',4,4',6-Pe	56558-17-9	Water	0.25	5	ng/L	70-130	70-130	30	1	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB123 (2',3,4,4',5-Pe	65510-44-3	Water	0.2	5	ng/L	54-121	54-121	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB126 (3,3',4,4',5-Pe	57465-28-8	Water	0.24	5	ng/L	48-129	48-129	30	1	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB128 (2,2',3,3',4,4'-	38380-07-3	Water	0.95	5	ng/L	43-114	43-114	30	1	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB132 (2,2',3,3',4,6'-	38380-05-1	Water	0.25	5	ng/L	70-130	70-130	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB138 (2,2',3,4,4',5'-	35065-28-2	Water	0.23	5	ng/L	52-116	52-116	30	1.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB141 (2,2',3,4,5,5'-	52712-04-6	Water	0.23	5	ng/L	70-130	70-130	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB149 (2,2',3,4',5',6-	38380-04-0	Water	0.29	5	ng/L	70-130	70-130	30	1	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB151 (2,2',3,5,5',6-	52663-63-5	Water	0.21	5	ng/L	70-130	70-130	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB153 (2,2',4,4',5,5'-	35065-27-1	Water	0.51	5	ng/L	40-115	40-115	30	1	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter

METHOD	DEFAULT PREP METHOD	ANALYTE	CAS No.	MATRIX	MDLa	MRL	UNITS	Accuracy (LCS %Rec)	Matrix Spike (%Rec.)	Precision (% RPD)	DOD LODb	DOD LOQc	UNITS	DOD QSM (LCS %Rec)	DOD QSM (Matrix Spike %Rec)	DOD QSM (%RPD)	DoD Cert	LIMS Code	Holding time	Container	Preservative	Minimum Volume
8082A Cong		PCB156 (2,3,3',4,4',5-	38380-08-4	Water	0.29	5	ng/L	51-126	51-126	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB157 (2,3,3',4,4',5'-	69782-90-7	Water	0.32	5	ng/L	46-118	46-118	30	0.25	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB158 (2,3,3',4,4',6-	74472-42-7	Water	0.21	5	ng/L	49-124	49-124	30	1	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB166 (2,3,4,4',5,6-I	41411-63-6	Water	0.44	5	ng/L	70-130	70-130	30	1	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB167 (2,3',4,4',5,5'-	52663-72-6	Water	0.19	5	ng/L	52-128	52-128	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB168 (2,3',4,4',5',6-	59291-65-5	Water	0.27	5	ng/L	70-130	70-130	30	1	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB169 (3,3',4,4',5,5'-	32774-16-6	Water	0.41	5	ng/L	44-119	44-119	30	1	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB170 (2,2',3,3',4,4',	35065-30-6	Water	0.28	5	ng/L	46-121	46-121	30	0.25	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB174 (2,2',3,3',4,5,	38411-25-5	Water	0.95	5	ng/L	70-130	70-130	30	0.25	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB177 (2,2',3,3',4',5,	52663-70-4	Water	0.19	5	ng/L	70-130	70-130	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB18 (2,2',5-Trichlor	37680-65-2	Water	0.95	5	ng/L	47-131	47-131	30	1.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB180 (2,2',3,4,4',5,	35065-29-3	Water	0.35	5	ng/L	54-131	54-131	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB183 (2,2',3,4,4',5',	52663-69-1	Water	0.2	5	ng/L	52-114	52-114	30	1.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB184 (2,2',3,4,4',6,	74472-48-3	Water	0.19	5	ng/L	55-124	55-124	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB187 (2,2',3,4',5,5',	52663-68-0	Water	0.26	5	ng/L	43-158	43-158	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB189 (2,3,3',4,4',5,	39635-31-9	Water	0.24	5	ng/L	55-122	55-122	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB194 (2,2',3,3',4,4',	35694-08-7	Water	1.6	5	ng/L	70-130	70-130	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB195 (2,2',3,3',4,4',	52663-78-2	Water	0.29	5	ng/L	54-127	54-127	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB201 (2,2',3,3',4,5',	40186-71-8	Water	0.17	5	ng/L	70-130	70-130	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB203 (2,2',3,4,4',5,	52663-76-0	Water	0.21	5	ng/L	70-130	70-130	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB206 (2,2',3,3',4,4',	40186-72-9	Water	0.2	5	ng/L	49-116	49-116	30	1.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB209 (Decachlorot	2051-24-3	Water	0.34	5	ng/L	57-133	57-133	30	1.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB28 (2,4,4'-Trichlor	7012-37-5	Water	5	5	ng/L	58-125	58-125	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB31 (2,4',5-Trichlor	16606-02-3	Water	0.39	5	ng/L	70-130	70-130	30	3	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB33 (2',3,4-Trichlor	38444-86-9	Water	0.84	5	ng/L	70-130	70-130	30	1.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB37 (3,4,4'-Trichlor	38444-90-5	Water	0.28	5	ng/L	70-130	70-130	30	1	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB44 (2,2',3,5'-Tetra	41464-39-5	Water	0.35	5	ng/L	55-119	55-119	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB49 (2,2',4,5'-Tetra	41464-40-8	Water	0.51	5	ng/L	70-130	70-130	30	1	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB5 (2,3-Dichlorobip	16605-91-7	Water	0.29	5	ng/L	70-130	70-130	30	3	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB52 (2,2',5,5'-Tetra	35693-99-3	Water	0.67	5	ng/L	51-112	51-112	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB56 (2,3,3',4'-Tetra	41464-43-1	Water	0.21	5	ng/L	70-130	70-130	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB60 (2,3,4,4'-Tetra	25569-80-6	Water	0.26	5	ng/L	31-138	31-138	30	1	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB66 (2,3',4,4'-Tetra	32598-10-0	Water	0.3	5	ng/L	59-129	51-114	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB70 (2,3',4',5-Tetra	32598-11-1	Water	0.2	5	ng/L	70-130	70-130	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB74 (2,4,4',5-Tetra	32690-93-0	Water	0.2	5	ng/L	70-130	70-130	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB77 (3,3',4,4'-Tetra	32598-13-3	Water	0.25	5	ng/L	40-111	40-111	30	1	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB8 (2,4'-Dichlorobip	34883-43-7	Water	0.71	5	ng/L	56-128	56-128	30	1.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB81 (3,4,4',5-Tetra	70362-50-4	Water	0.26	5	ng/L	47-114	47-114	30	1	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB87 (2,2',3,4,5'-Pe	38380-02-8	Water	0.19	5	ng/L	55-116	55-116	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB90 (2,2',3,4',5-Pe	68194-07-0	Water	1.1	5	ng/L	31-132	31-132	30	1	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB95 (2,2',3,5',6-Pe	38379-99-6	Water	0.88	5	ng/L	70-130	70-130	30	3	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB97 (2,2',3',4,5-Pe	41464-51-1	Water	0.32	5	ng/L	70-130	70-130	30	1.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		PCB99 (2,2',4,4',5-Pe	38380-01-7	Water	0.27	5	ng/L	70-130	70-130	30	0.75	5	ng/L			30	Y		7/40 days	er amber g	4C	1 liter
8082A Cong		Tetrachloro-m-xylene	877-09-8	Water	NA	NA	%	26-100	NA	NA	NA	NA	%			NA	NA		7/40 days	er amber g	4C	1 liter
8082A LL		Aroclor 1016	12674-11-2	Soil	2.1	10	ug/kg	37-121	27-128	40	4.25	10	ug/kg	40-140	30	40	Y		NA	8oz jar	4C	20g
8082A LL		Aroclor 1221	11104-28-2	Soil	2.1	20	ug/kg	-	-	-	4.25	20	ug/kg			-	Y		NA	8oz jar	4C	20g
8082A LL		Aroclor 1232	11141-16-5	Soil	2.1	10	ug/kg	-	-	-	4.25	10	ug/kg			-	Y		NA	8oz jar	4C	20g
8082A LL		Aroclor 1242	53469-21-9	Soil	2.1	10	ug/kg	-	-	-	4.25	10	ug/kg			-	Y		NA	8oz jar	4C	20g
8082A LL		Aroclor 1248	12672-29-6	Soil	2.1	10	ug/kg	-	-	-	4.25	10	ug/kg			-	Y		NA	8oz jar	4C	20g
8082A LL		Aroclor 1254	11097-69-1	Soil	2.1	10	ug/kg	-	-	-	4.25	10	ug/kg			-	Y		NA	8oz jar	4C	20g
8082A LL		Aroclor 1260	11096-82-5	Soil	2.1	10	ug/kg	42-123	29-131	40	4.25	10	ug/kg	60-130	30	40	Y		NA	8oz jar	4C	20g
8082A LL		Aroclor 1262	37324-23-5	Soil	2.1	10	ug/kg	-	-	-	4.25	10	ug/kg			-	Y		NA	8oz jar	4C	20g
8082A LL		Aroclor 1268	11100-14-4	Soil	2.1	10	ug/kg	-	-	-	4.25	10	ug/kg			-	Y		NA	8oz jar	4C	20g